



EXPERIMENTING WITH SOCIAL NORMS

Fairness and Punishment in Cross-Cultural Perspective

JEAN ENSMINGER AND JOSEPH HENRICH, EDITORS





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Edited by Jean Ensminger and Joseph Henrich

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Part I

Theory, Method, and Comparative Analysis

Chapter 1

Introduction, Project History, and Guide to the Volume

Jean Ensminger and Joseph Henrich

This work represents the second volume emerging from a collaboration among about two dozen anthropologists and economists that began in 1997. Our goal in this volume is to shed light on the historical emergence of prosocial norms and their relationship to economic growth. By contrast with other primates, how is it that human societies manage to solve problems collectively and entice individuals to operate against their own narrow, short-term, economic self-interest and instead engage in behavior that benefits the group as a whole, or some significant subset? We argue that understanding the origins of such prosocial behavior, including the willingness to pay a price to punish those who violate such norms, is a necessary condition prior to the ability to live in large social groups with complex divisions of labor. Life in larger concentrations is in turn essential to economic growth and productivity, thus affording higher economic well-being.

To approach this question, we have integrated analytical and methodological approaches from experimental economics with the richness, context, and depth of anthropological field ethnography. Our team has administered the same economic experiments, according to controlled protocols, in highly diverse societies around the world that live with different levels of sociopolitical complexity and involvement in the market economy. We have sought to interpret our findings in light of how daily life operates in these diverse locales. The purpose is to understand how the behavioral differences that we observe in the economic experiments map across the substantial spectrum of the societies that we sampled. Ultimately, by tapping the extant global diversity, our efforts begin to illuminate the mechanisms behind the coevolution of social norms, economic growth, and the emergence of complex societies (see chapter 2).

Our sample includes hunter-gatherers, slash-and-burn horticulturalists, livestock herders, fisherfolk, cash-cropping farmers, and wage laborers in industrialized societies. We have also drawn from an impressive geographical distribution that spans Africa, South America, Papua New Guinea, Siberia, Oceania, and North America.

We employ economic experiments in this endeavor because they provide a scientifically rigorous method to get a handle on otherwise squishy socioeconomic phenomena, which can be challenging to measure and compare. This approach involves playing games for nontrivial sums of real money. In a sense, this is a real economic decision, albeit in an unfamiliar situation. The use of nontrivial sums of money in a stark, simple decision situation has practical, ethical, and scientific advantages that we discuss in greater detail in later chapters. In brief, this serves to increase participation (allowing us to obtain representative samples), focuses the participant's mind on the task, and suppresses the kind of “cheap talk” that one often gets with similar “what would you do?” hypothetical scenarios. While one might be able to devise alternative methods of measuring fair-mindedness, cooperation, social norms, and the willingness to punish norm violators in widely varying contexts, to date we are not aware that any other method has the potential for such broad, controlled comparisons.

The core experiments that we employed in phase 2 of this project and report in this volume are the dictator game (DG), the strategy method ultimatum game (UG), and the third-party punishment game (TPG) (see chapter 3 for extended discussion of the games and protocols). The dictator game is the closest thing we have to a pure measure of fairness. As is the case in all of our experiments, two players from the same community interact anonymously in the dictator game. Both players know that the money, a sum equivalent to one day's local wage, has been allocated to the pair, but that it is player 1's job to decide how to allocate it. Both players receive the actual money that player 1 “dictates.” In experiments done in Europe and the United States, a fifty-fifty split is generally considered a “fair” outcome. By contrast, a rational money maximizer will dictate zero for player 2.

Our second game, the ultimatum game, adds a complication to the dictator game. In this version, player 1 makes the allocation to player 2 as before, but now player 2 has the option of rejecting the offer, in which case neither party receives anything. As in all of our experiments, both players

have full knowledge of the rules of the game before play. In the UG version that we run, referred to as the “strategy method,” we ask player 2 to respond to all potential offers (before hearing the actual offer), but we make clear that they are bound by their response to the specific offer level that player 1 actually makes. The behavior of player 1 in this experiment has elements of fairness, but also of strategy. Player 1 may prefer to make a low offer, but may make a higher one, anticipating that a low offer might be rejected by player 2. Furthermore, the behavior of player 2 in this game captures the price that people are willing to pay to punish player 1 for what they perceive to be an unfair offer. This willingness to punish an anonymous partner, at a personal monetary cost, can also be interpreted as a benefit to the group, since it cannot affect the future interactions of this pair, but it can have an impact on player 1's behavior with others in the future. This choice can also be interpreted as prosocial behavior, because there are positive externalities for society when those who might be inclined to violate norms of fairness, as might happen when one reneges on a contract, change their behavior because they anticipate that others are prepared to undertake such punishment at personal cost. Since a rational money maximizer would never reject any positive offer, a money-maximizing player 1 will make very low (but positive) offers.

Our third core experiment adds yet another element. In the third-party punishment game, two people play the equivalent of a dictator game, but there is a third player who is also endowed with money equivalent to half the amount that the first two are dividing up and whose existence, but not identity, is known to all players. The third player has the option of using part of her or his stake to punish player 1 for having made what player 3 considers an unacceptable offer to player 2. In this game, unlike the UG, the player paying a price to do the punishing is not the injured party. This is evidence of powerful prosocial behavior aimed at ensuring that members of society abide by local norms. As in the UG, since a money-maximizing player 3 would never pay to punish, a money-maximizing player 1 will offer zero to player 2.

Among the diverse societies that we study, we see a great deal of evidence that people do not play these games as money maximizers. As we explore the highly diverse behaviors that emerge across our global sample, we begin to see patterns that shed light on the coevolution of social norms of fairness and punishment, together with the development of markets,

world religions, and life in denser populations with more complex sociopolitical systems.

This chapter has two aims. First, we provide a brief and personalized history of the overall project. Second, we outline the organization and content of the volume, highlighting some of the key topics covered in each chapter.

THE HISTORY OF THE PROJECT

Our story begins during the winter quarter of 1995 in Robert Boyd's graduate seminar in the Anthropology Department at UCLA. Boyd had just returned from a small conference that was part of the MacArthur Foundation's Preferences Network, an interdisciplinary group of researchers focused on understanding the nature and origins of human preferences, with the goal of improving our models of human decisionmaking (for details on this group, see Henrich et al. 2004, ch. 1). In the seminar, Boyd casually presented what he had learned at the conference about recent work in behavioral and experimental economics, and in particular he discussed the ultimatum game. Joe Henrich, a graduate student at the time who had been working on economic decisionmaking and cooperation among an indigenous population in the Peruvian Amazon called the Machiguenga (Matsigenka), was particularly intrigued because he had been studying models of the evolution of cooperation and also trying to figure out why he observed so little cooperation among the Machiguenga. After some reading in experimental economics, Henrich developed a protocol for the ultimatum game and ran it that summer with Machiguenga participants in the village of Camisea, along the Urubamba River. In the week leading up to his departure, Henrich told Boyd of his plans, and both had the intuition that Machiguenga would probably behave like other populations.

Henrich's preliminary results were surprising, as they sharply contrasted with prior results that had been robust across diverse industrialized countries. The Machiguenga made low offers and would not reject, while in previous cross-cultural work people had made much higher offers and would reject low offers. In describing the results to Boyd, Henrich worried that there might have been a problem with the protocol design or the implementation. Nevertheless, Boyd felt that this was worth pursuing, and on the advice of Colin Camerer, Henrich and Boyd requested and received

funding for a U.S. control experiment to see if the anomalous results could be traced to the particular protocol. With a stake of $160 selected to match the Machiguenga stakes, UCLA graduate student subjects split the money fifty-fifty in the ultimatum game, with a single exception. This result, in line with the work of others, gave Henrich confidence that the Machiguenga result might be robust and indicative of strong population-level differences. The next summer Henrich returned to the Machiguenga, along with Natalie Smith (now Natalie Henrich), and performed more experiments, including a common pool resources game. The ultimatum game data converged with the common pool resource game data: the Machiguenga of Camisea were behaving quite differently from prior populations (Henrich 2000; Henrich and Smith 2004).

Around this time Henrich was invited to the Society for Economic Anthropology in Guadalajara, Mexico, where he presented his nascent experimental work with the Machiguenga. The anthropologists' reaction was a mix of dismissal, disdain, and some interest. Immediately after his talk, Jean Ensminger approached Henrich, and an enduring collaboration was born, as Ensminger would later team with Henrich in spearheading phase 2.

The Machiguenga research became pilot work in Boyd and Henrich's effort to write a larger proposal for the Preferences Network at the MacArthur Foundation. The proposal was intentionally inductive, seeking to “see what's out there,” but the proposal did lay out the social, ecological, and economic variables that might relate to game play, including social stratification, level of sociopolitical complexity, market integration, and sedentism, as well as the potential effects of property rights, context, mediums of exchange, and a variety of other methodological issues. The proposal was funded, and Boyd began writing letters to researchers who had interesting field sites and might be interested in collaboration. The invitation was to run the ultimatum game in diverse human societies.

In January 1998, a group of anthropologists were assembled at UCLA, along with key members of the Preferences Network, including Samuel Bowles, Colin Camerer, Catherine Eckel, Ernst Fehr, and Herbert Gintis. Basic concepts in game theory were presented along with experimental techniques, and methodology was discussed at length. The focus shifted away from the more specific hypotheses to whether these kinds of experiments were at all feasible at most field sites. Was it logistically

possible to run identical experiments in a diverse sampling of small-scale societies? Many at the meeting wanted to create a standardized protocol, but most efforts to stipulate a particular way of doing the experiments were met with practical concerns from at least one fieldworker. Consequently, we did not create a rigorous protocol, but provided only guidelines in order to give researchers the flexibility to adapt in the field. In hindsight, this was a mistake, but under the conditions of extreme uncertainty regarding feasibility, it was probably necessary to get the project off the ground.

Over the next two years, the experiments of phase 1 were completed, and we reconvened at UCLA to present and discuss our findings. Along the way, fieldworkers dropped out and new ones were drafted. In the end, the phase 1 research group was composed of the following fieldworkers (and research sites): Michael Alvard (Lamalera, Indonesia), Abigail Barr (Shona, Zimbabwe), Jean Ensminger (Orma, Kenya), Francisco Gil-White (Torguuds and Kazakhs, Mongolia), Michael Gurven (Tsimane', Bolivia; Ache, Paraguay), Joseph Henrich (Machiguenga, Peru; Mapuche, Chile), Natalie Henrich (Machiguenga, Peru), Kim Hill (Ache, Paraguay), Frank W. Marlowe (Hadza, Tanzania), Richard McElreath (Sangu, Tanzania), John Q. Patton (Achuar and Quichua, Ecuador), and David Tracer (Au and Gnau, Papua New Guinea). These findings were presented in our 2004 volume (Henrich et al. 2004), *Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*, as well as in syntheses published in the *American Economic Review* (Henrich et al. 2001) and *Behavioral and Brain Sciences* (Henrich et al. 2005).

Phase 2 of the project began in 2002 when we (Ensminger and Henrich) teamed up to write a proposal for a second round of experimental work for the National Science Foundation. This proposal eventually was cofunded by the programs for economics, anthropology, and decision, risk, and management sciences. Phase 2 aimed to improve on the first phase, both methodologically and theoretically. We designed a package of three one-shot bargaining experiments, including an alternative (strategy method) version of the ultimatum game (allowing us to replicate our prior work), paired with both a dictator game and a third-party punishment game. Methodologically, our team had now established that economic games of this type could be done in small-scale societies, so it was time to push the bar of methodological rigor higher, by creating standardized protocols

including pregame tests, scripts, postgame interviews, and procedures to specifically address the many criticisms and concerns we and others had regarding our first efforts (many of these are discussed in the commentaries in Henrich et al. 2005). In an effort to understand what our experiments actually measure, we also proposed to explore the effects of contextual manipulations, double-blind treatments, and social networks. Theoretically, in a manner consistent with a coevolutionary approach to motivations and social norms, findings from the first phase suggested that ultimatum game offers are related to market integration. But, while suggestive, we had only a subjective rank variable for market integration at the population level, and no systematic data across groups to control for variables such as income, wealth, and education. Thus, our efforts in the second phase focused on gathering variables to measure market integration, along with nineteen other variables to address alternative explanations for any patterns we might unearth (see chapter 3).[1] For the sites in phase 2, we retained four of the populations from phase 1 (allowing us to check for replication) and added twelve new sites. In particular, we sought to add another Papua New Guinea site so that we could examine more deeply the unusual findings from phase 1, which diverged from our market integration hypothesis. Thus, if we replicated our findings for market integration, we would be doing so with a largely new sample of societies, including one additional New Guinea population that was specifically selected because it challenged our prior results.

The goal of this volume is to document and synthesize phase 2 of what has come to be called the Roots of Human Sociality Project. This work aims to complement our journal publications on phase 2 (Henrich, Ensminger, et al. 2010; Henrich et al. 2006; Marlowe et al. 2008) by providing a more expansive and detailed theoretical context and compilation of our efforts, communicated in a more widely accessible manner.

In 2001–2002, Ensminger piloted an early version of our protocol among the Orma in Kenya and in rural Missouri. This version included dictator games (chapters 5 and 18), double-blind dictator games (chapter 5), and strategy method ultimatum games (chapter 18, available at: http://www.russellsage.org/Ensminger). At a workshop in 2002 at the California Institute of Technology, we pulled the new phase 2 team together; in a marathon of intense discussion informed by the pilot

experience, as well as the experiences of many team members who had participated in phase 1 and subsequently run additional experiments on their own, we hammered out a protocol involving three games: the dictator game, the strategy method ultimatum game, and the third-party punishment game. We selected these games because we thought that they would work across sites and would permit us to replicate and greatly expand our earlier work. This was an immensely difficult task and required considerable honing before the final protocols, scripts, and survey instruments for the collection of the social and economic demographic data could go back out to the group.

The phase 2 fieldwork occurred in 2003 and 2004, and we met at Caltech in 2004 to present and discuss our results. In the end, the researchers who arrived with data and chapters in hand are represented in this volume: Abigail Barr (Accra, Ghana), Clark Barrett (Shuar, Ecuador), Alex Bolyanatz (Sursurunga, Papua New Guinea), Juan-Camilo Cardenas (Sanquianga, Colombia), Jean Ensminger (Orma, Kenya; Missouri, United States), Mike Gurven (Tsimane', Bolivia), Laban Gwako (Gusii and Maragoli, Kenya), Joseph Henrich and Natalie Henrich (Yasawa Island, Fiji; Emory University undergraduates, United States), Carolyn Lesorogol (Samburu, Kenya), Frank W. Marlowe (Hadza, Tanzania), Richard McElreath (Isanga village, Tanzania), David Tracer (Au, Papua New Guinea), and John Ziker (Dolgan and Nganasan, Siberia). Andrew Harris was a research assistant to the project and compiled all the data sets into a single master file.

A GUIDE TO THE VOLUME

This volume is broken into two parts. Part I consists of five chapters, which introduce the project and present an integrative discussion of the overall effort; part II presents the findings from each of the individual research sites. (Part I is available in print or as part of the eBook; Part II is available only digitally, either as part of the eBook or as a free download, which can be found at: https://www.russellsage.org/publications/experimenting-social-norms.)

Part I: Theory, Method, and Comparative Analysis

Part I presents the theory, methods, and empirics from the aggregate analysis of all sites, focusing on explaining the mechanisms underlying the cross-population variation in social norms. Chapter 2 lays out our theoretical framework for thinking about social norms, individual decisions, development, and cultural evolution. It draws from diverse literatures on social norms—including evolutionary and classical game theory, economic theory of institutions, economic history, neuroeconomics, child development, cognitive science, and ethnography—to develop an understanding of what behavioral games measure and a set of predictions regarding what to expect in analyses of our bargaining experiments across diverse societies.

Chapter 3 presents our background and methodology and provides details on our experiments, protocols, field sites, and socioeconomic data collection. This chapter has been written not only to document how we proceeded but also to help guide future researchers by warning of logistical pitfalls associated with field experiments and the general lessons we have learned. It also includes remarks about running large-scale, cross-cultural projects that should have relevance to other collaborative projects, whether experimental or not.

Chapter 4 synthesizes the major empirical findings from our comparative analyses. These findings largely replicate and extend our prior efforts based on results from the ultimatum game by showing that fairness, as now measured in three behavioral experiments, varies substantially across societies in a manner positively associated with degrees of market integration. While controlling for seven economic and demographic variables, we also show that participation in a world religion (Christianity or Islam) is associated with higher offers. From our measures of willingness to punish unfairness in two different experiments, our analyses show a strong positive relationship with community size, such that people from larger communities are more willing to punish unfairness even in these one-shot anonymous experiments.

Field experiments were extremely rare prior to our first volume, and most particularly among small-scale, remote populations. As a consequence, some readers of our original set of experiments wondered if there could be unknown effects resulting from the experimenter-subject interaction that explained some of the differences between our results and those typical of Western experiments done largely with university

populations. In our final chapter in part I, we set out to test whether there was an "experimenter effect." In chapter 5, Carolyn Lesorogol and Jean Ensminger report on the paired double-blind and standard dictator game protocols run in three of our study sites: Orma, Samburu, and rural Missouri. In the double-blind protocol game, administrators are prevented from knowing what participants do in the experiment and subjects know that their behavior is anonymous, even to the experimenters. What we learned is that compared to our standard single-blind treatment, in which the experimenter knows the player's decision, double-blind treatments matter little among the Orma and Samburu in Kenya, where people were just as generous when they knew that no one, not even the researcher, would know how they had played. Among nonstudent adults in rural Missouri, the double-blind treatment mattered less than is typically the case among American undergraduates (Cherry, Frykblom, and Shogren 2002), but it affected their behavior significantly more than it did among the two African populations. These results encourage us by suggesting that the experimenter effect may be absent in the developing world when the experimenter and subject are of different ethnicities, which is the case in all but one of our case studies (the Gusii, chapter 12, available at: http://www.russellsage.org/Ensminger).

Part II: Society Case Studies

The chapters in part II of the volume are written by the fieldworkers and focus on within-site variation. Each author presents and interprets the data from his or her own field site, based on their own experience, ethnographic knowledge, and other sources of data. Presentations across chapters are standardized: each chapter provides ethnographic background on the population and details on any methodological variations on those presented in chapter 3 or protocol anomalies. The presentation of results is also standardized to a large degree; that standardization was built into the project protocol, as the same six demographic control variables (age, sex, education, individual income, household wealth, and household size) were collected at almost all sites. Each author presents histograms of these basic demographic data, presents some of the same plots of the game data, and provides within-site regression analyses, including the control variables. Beyond that, researchers were encouraged to include any additional

analyses or plots they felt were appropriate and to interpret their findings as they saw fit.

In the following summary of each of the chapters, we have attempted to highlight aspects of the findings from a given site that correspond to or contrast with overall data trends in the cross-cultural comparisons. We have only occasionally referenced the demographic variation internal to specific societies, as these are often too complex to capture out of context. However, we have also highlighted some interesting ethnographic explanations by the authors for the variations off the trend, and these may lead others to propose and scientifically test new propositions in future research.

The chapters progress from least to most market-oriented, as measured by the percentage of calories purchased in the market versus those procured from hunting, gathering, fishing, cultivation, animal husbandry, or other home production. This organization of the chapters roughly tracks the change in subsistence from more nomadic foraging to shifting cultivation, horticulture, pastoralism, cash crop production, and wage work.

The first three chapters discuss three societies with virtually no market integration: the Hadza (Marlowe, chapter 6), the Au (Tracer, Mueller, and Morse, chapter 7), and the Tsimane' (Gurven, chapter 8). All three chapters are available at http://www.russellsage.org/Ensminger. They are also the only three societies in part II of the book that were part of phase 1 of the project. Despite using a different protocol and script, one involving the strategy method, this work largely replicates the same unusual findings seen in phase 1, with some qualifications among the Tsimane'.[2]

In chapter 6, Frank Marlowe returns to the Hadza of northern Tanzania, where he conducted phase 1 experiments (Marlowe 2004). The Hadza are our only nearly pure hunting-and-gathering population and our only society with no conversion to a world religion; they also have virtually no market integration. Consistent with the overall trend that we find in our cross-cultural data, the Hadza, at the lowest end of our market integration spectrum, make the lowest-average offers in the DG (26 percent) and the UG (26 percent). Contrary to what we might expect of people who make low offers, however, the Hadza have a relatively high rejection rate given their low offers, though it is still the case that a proposer's income-maximizing offer is 10 percent, the lowest positive offer. Such low offers and relatively high rejection rates parallel the Hadza findings from phase 1.

The addition of the third-party punishment game (TPG) in phase 2 provides us with the most intriguing results for the Hadza, as they are not inclined to engage in third-party punishment. Thus, while the Hadza will avenge a personal slight to themselves (as is the case with a low offer in the UG), they appear much less willing to pay a price to punish an injury to a third party (as in the TPG). Marlowe comments that this corresponds with the general failure of the Hadza to sustain collective action efforts. He notes that the Hadza agree among themselves to make a concerted effort to keep their agro-pastoralist neighbors out of their area, but the same individuals then turn around and undercut such initiatives by begging and trading with these same neighbors, thus eroding Hadza solidarity. Notably, there is a tendency for those living in larger Hadza camps to punish more in the TPG. This pattern replicates the overall trend that we see across societies. As settlement size increases, we see a greater tendency toward third-party punishment. This is the basis for our coevolutionary argument that the institution of third-party punishment was a necessary development before people were able to sustain life in larger communities. Over the four camps studied, the average camp size among the Hadza who played these games is forty-three—less than half the size of the next-smallest in our cross-cultural sample—so low TPG punishment in this society is consistent with our overall thesis.

While the Hadza are full-time foragers, the Au of Papua New Guinea have a highly diversified forager-horticulturalist subsistence that also includes some pig and chicken husbandry and small-scale cash-cropping. As detailed by David Tracer, Ivo Mueller, and Jennifer Morse in chapter 7, the Au have minimal wage employment, and they are one of the poorest groups in Papua New Guinea. Unlike the Hadza, the Au have been converted to Christianity. The average village size among game subjects was 309.

Tracer also participated in phase 1 of the project, and the Au produced some of the most interesting behavior in the original UG experiments: many Au made hyper-fair offers in the UG (above 50 percent), and those offers were often rejected. Although those results ran counter to our overall hypothesis regarding market integration, they have a well-known foundation in Melanesian ethnography. Tracer explains that norms of generosity and gift-giving are pervasive and intrinsic to the sociopolitical structure of Melanesian society. As he puts it, “The giving of an unsolicited

gift generates prestige for the giver and incurs a debt for the recipient.” One interpretation of the rejection of high offers is that people were bringing their internalized social norms into the context of the game and behaving as they would have behaved outside the laboratory. When confronted with a large gift, they chose not to take on the obligatory debt of reciprocity that they assumed to be associated with it. Such norms are characteristic of Melanesia in general, and to test the robustness of this unusual behavior we purposely sought out another Melanesian sample (the Sursurunga) to add to our phase 2 project (see Bolyanatz, chapter 11, this volume, available at: http://www.russellsage.org/Ensminger).

Working in three Au villages, phase 2 produced results that replicated Tracer's phase 1 results: the mean offer of the DG is 41 percent, the mean in the UG is 44 percent, and the Au display high punishment in the UG. Like the Hadza, the Au are also inclined to punish in the UG. Unlike the Hadza, however, the Au also punish high offers in the UG, and their hyper-fair punishment rates increase as the offers approach 100 percent, yielding a distribution with a U-shaped curve on which no punishment is at fifty-fifty.

Our third case study with exceptionally low market integration comes from the Amazon. Michael Gurven also returned to his phase 1 population, the Tsimane' of Bolivia. The Tsimane' are forager-horticulturalists who usually live in small, dispersed villages. Across the two villages studied this time, the average village size of participants in these games was 314, and Tsimane' report Christianity as their religion. They live off their horticulture, fishing, hunting, and gathering. Like the Hadza, the Tsimane' make low offers in both the DG (26 percent) and the UG (27 percent). But unlike the Hadza, they fail to punish in either the UG or the TPG. Only one out of thirty-three players reject an offer of 10 percent in the UG, and 36 percent do not even reject an offer of zero. The Tsimane' UG offers for the phase 2 study reported here are lower than the Tsimane' offers from previous experiments conducted by Gurven in three villages, but consistent with those from two other villages. Gurven has written about the tendency for offers among the Tsimane' to vary by village, but he has had difficulty pinning down the variables that may be related to the differences (Gurven 2004; Gurven, Zanolini, and Schniter 2008). The results reported in this chapter (low offers and low punishment) are extremely consistent with those reported for the Machiguenga (Henrich 2000), who share many ethnographic similarities with Tsimane' villagers (Johnson 2003).

Our next three case studies are all new sites and come from horticultural societies with a low level of market integration (20 to 25 percent): the Yasawans of Fiji (Henrich and Henrich, chapter 9), the Shuar of Ecuador (Barrett and Haley, chapter 10), and the Sursurunga of New Ireland, Papua New Guinea (Bolyanatz, chapter 11). Chapters 9, 10, and 11 are all available at http://www.russellsage.org/Ensminger). Among these three societies we find high levels of conversion to Christianity, except among the Shuar: roughly 17 percent of that sample do not identify as Christians.

In the northwestern corner of the Fijian archipelago, Yasawa Islanders are quite a relatively isolated population who subsist on root-crop horticulture, littoral gathering, and fishing; access to wage labor is quite rare, but trade in basic commodities is common. In chapter 9, Joseph Henrich and Natalie Henrich provide a particularly detailed description of the importance of cooperative labor activities in the two study communities, which average 110 members. All residents identify with one of several Christian churches. Yasawan mean offers in the DG and the UG are 35 and 39 percent, respectively. The Yasawa show little willingness to punish low offers in the UG, including offers of zero. Like a number of our other societies, however, they do exhibit a weak to moderate U-shaped curve in UG punishment, such that their tendency to punish hyper-fair offers over 50 percent increases as the offers approach 100 percent. People's willingness to punish in the TPG is also relatively mild.

In an effort to test even more plausible variables that might explain intracultural variation, Henrich and Henrich add a number of measures not found in the other case studies. To capture individual social status within the village they use a measure of network centrality and add it to the same six demographic variables used in all sites. They have also computed the average degree of relatedness to other members of the local population and within the particular game session. None of these additional variables, however, explain intrasocietal variation among this population.

In addition to running the games on Yasawa Island, the Henrichs also played the full set of games (DG, UG, and TPG) among Emory University undergraduates; these results are also reported in chapter 9. This was done in order to create a baseline for comparison between the project protocol of phase 2 games and the many university samples that exist in the literature, as well as the adult population sampled in rural Missouri (Ensminger and Cook, chapter 18, available at: http://www.russellsage.org/Ensminger). The

Emory undergraduate offers in the DG and the UG are consistent with what others have observed among university populations, but are considerably lower than what we observe among the adult population of rural Missouri, as well as among other nonstudent adult populations in developed societies (see Ensminger and Cook, chapter 18).

The Shuar (Barrett and Haley, chapter 10, available at: http://www.russellsage.org/Ensminger) of the Ecuadorian Amazon, whose economy is based primarily upon horticulture and hunting, represent our second moderately low-market-integration society. Culturally, they are closely related to the Achuar in Ecuador, who were studied in phase 1 (Patton 2004). Their society is currently in a state of considerable flux as roads and markets are encroaching and animal and fishing resources are being depleted. Across two villages, the mean village size is a moderately high 498, and 76 percent of the population identify themselves as Christian, while the remainder do not identify with a world religion. At the time of Clark Barrett and Kevin Haley's study, people were not realizing much income in the form of market exchange, and they were nutritionally stressed. Like the Tsimane', the Shuar have historically lived in small, family-based villages, but maintain indigenous institutions of communal work parties and norms of cooperation. In this regard, the Shuar resemble the Tsimane' more than Yasawans, for whom the more pervasive ethos is communality and cooperation.

Shuar mean offers in the DG (35 percent) and UG (37 percent) are similar to those of the Yasawa (35 and 40 percent, respectively), as is their mean minimal acceptable offer in the UG (7 percent in both cases). Just like the Yasawa, 30 percent of the Shuar are unwilling to punish offers of zero in the UG. However, the Shuar diverge considerably from most of the other societies discussed up to this point (with the exception of the Au) when it comes to their punishment behavior in the TPG. Although the Shuar engage in limited punishment in the UG, they are quite active in third-party punishment. About 40 percent will pay to punish offers as high as 40 percent. Among the six low- to moderate-market-integration societies discussed up to this point, only the Au are more aggressive in third-party punishment. Shuar offers also are a bit less than those of the Achuar, who offered 43 percent in phase 1.

The Sursurunga (Bolyanatz, chapter 11, available at: http://www.russellsage.org/Ensminger) were added to our project in phase 2

in an effort to further explore the unusual findings from Tracer's phase 1 work among the Au and Gnau, where the results ran counter to the main body of our findings: the society had low market integration, but high offers in the UG. Tracer's (2004) explanation for this was rooted in the ethnography of Melanesia, where societies are well known for excessive gift-giving, as well as a reluctance to take on such indebtedness, which Tracer speculated might account for both their willingness to make and reject offers over half of the stake. We wished to explore this explanation for game behavior by including a third Melanesian society.

The Sursurunga of New Ireland, Papua New Guinea, are swidden horticulturalists who occasionally fish, gather shellfish, and plant cash crops. Purchased rice is a regular part of their diet. The road through this area has deteriorated since the 1990s, and this population's involvement in the market economy has actually declined in recent years as economic hardship (less wage work and cash-cropping) has forced them back to more subsistence production. Across three villages, the average village size is low, at 187 people.

Relative to the Au, the Sursurunga are from a geographically distant part of Papua New Guinea, but like the Au, they display the same Melanesian predilection toward extensive gift-giving, and indeed, Alexander Bolyanatz's findings substantially extend Tracer's earlier work, as did the work of Tracer's team in phase 2 of the project reported here (chapter 7, available at: http://www.russellsage.org/Ensminger). Sursurunga mean offers in the DG exactly match those among the Au, with a mean of 41 percent. Their UG mean offer of 51 percent is even higher than that of the Au (44 percent). Like the Au, they both make and reject many hyper-fair offers in the UG. The main difference between the two is that the Sursurunga do more punishment across the board in the UG, rejecting even offers of half the stake 28 percent of the time. Like Tracer, Bolyanatz interprets the behavior of the Sursurunga in terms of their ethos of balanced reciprocity and equality. Delving more deeply into this possibly pan-Melanesia pattern, Bolyanatz argues on the basis of ethnographic evidence that this “giving with a purpose” is more rational self-interest than altruism in the context of this society, in which there is a strong tendency to wish to avoid receiving too much. Aggressive gift-giving is perceived as a premeditated effort to publicly humiliate a rival, enemy, or detractor; “giving is an unfriendly, even somewhat hostile act because it is an attempt

to exert control over the behavior of another." These observations help explain the behavior of both the Au and the Sursurunga, who are our two main outlier populations with respect to the overall tendency for offers to increase with market integration.

Our next two case studies are from Kenya, and both are cash-cropping farmers who are far more economically integrated than the previously discussed populations. Nevertheless, the Gusii and Maragoli, studied by Edwins Gwako (chapter 12, available at: http://www.russellsage.org/Ensminger), do not score as highly on our market integration variable as one might expect (28 and 43 percent, respectively), primarily because they are rural, agrarian societies that still live off their own produce. However, their mean education (most have completed high school) is dramatically higher than that of the societies we have previously discussed, as are other signs of their connection to the global market. For example, many absent family members engage in long-distance wage labor in large cities. Both populations also live in large settlements that average close to four thousand, and both are devout Christians. Gwako collected data from three communities in each population.

Although these two ethnic groups are distinct today, they do share a common ethnic ancestry; however, the particular populations who participated in the experiments faced dramatically different economic circumstances. A major difference between the two societies is that the Maragoli have extremely high population density, and at the time of the experiments a severe drought was adding to that stressor. In contrast, the Gusii studied here have large farms and are significantly wealthier, and the experiments were conducted in a normal year.

The most striking result from this pair of studies is the exceptionally high level of prosocial punishment that we find among both groups in both the UG and the TPG. These are the highest measures of punishment reported in any of our societies. Both societies have highly effective organizations for collective action, and Gwako posits that these organizations function because both societies have developed social norms to contend with free riders, and that is what is captured in the exceptionally high punishment behavior in the games. Both societies are also conservative Christian, with high levels of religious participation, and this could also be a factor in their punishment behavior. These societies live in the largest

communities that we sampled, which is consistent with our theory of the coevolution of prosocial punishment and the ability to sustain cohabitation in large groups.

Moving up the market integration spectrum, the next two studies come from former and current pastoralists: the Dolgan and Nganasan of Siberia (Ziker, chapter 13, available at: http://www.russellsage.org/Ensminger) and the Samburu of Kenya (Lesorogol, chapter 14, available at: http://www.russellsage.org/Ensminger). These groups are relatively highly integrated into the market economy: at 63 and 69 percent, respectively, and their levels of market integration are similar to those of the Orma pastoralists (72 percent), who participated in only the DG (see Lesorogol and Ensminger, chapter 5).

The Dolgan and Nganasan (Ziker, chapter 13, available at: http://www.russellsage.org/Ensminger) are historically distinct ethnic groups in northern Siberia, but most have lived together in modern permanent villages since the 1960s and 1970s, as did this study population. While the Dolgan were historically reindeer pastoralists who also hunted, fished, trapped, and engaged in mercantile trading, they settled into work collectives in the Soviet era. The Nganasan were historically known for wild reindeer hunting and used small herds of domestic reindeer for decoys. Another distinction between the two groups is that the Dolgan accepted Russian Orthodoxy in the nineteenth century (96 percent so identify), while the Nganasan continued to have active shamans into the 1970s (and only 12 percent of the players identify as Christians). Today both the Dolgan and the Nganasan receive state support and continue to hunt wild reindeer, to fish, and to trap. They consume reindeer or fish at almost every meal. The village from which all players were drawn has 612 residents.

The mean DG (37 percent) and UG (43 percent) offers of the Dolgan and Nganasan place them just slightly below the predicted expectation for our full sample of fifteen societies based on market integration alone. In the demographic regressions for this population, income is strongly correlated with DG offers, but this does not hold for the UG. John Ziker makes the important point that it is unclear to what extent this is strictly an income effect, as opposed to a proxy for intrasocietal variation in market integration and familiarity with modern institutions. Most of those with high incomes are teachers and civil servants, who have the most interaction with outside bureaucracies and institutions. Particularly successful (high-income)

hunters and fisherman also tend to be involved in more market and trade relations. The regression analyses also show large positive effects for attendance at religious service on DG offers, though not on UG offers. The rejection behavior for the Dolgan and Nganasan in the UG falls roughly in the middle of our cross-cultural sample, which is also consistent with their mid-ranking status by market integration. The TPG was not conducted among this population.

Our next-highest market integration study also focused on a pastoralist community, the Samburu of Kenya (Lesorogol, chapter 14, available at: http://www.russellsage.org/Ensminger). Unlike the Dolgan and Nganasan, the Samburu are still active herders of cattle, sheep, goats, and increasing numbers of camels. Their economy has seen many changes in recent years, however, including increasing economic diversification (including some cultivation) and labor migration for wage employment. Many petty trading activities provide income, especially for women, while men try to pursue livestock marketing if they can muster the capital. Land tenure has also changed, as this area became a group ranch in the 1970s. Sixty-six percent of the Samburu identify as Christian, while the remainder practice their indigenous religion. Samburu mean offers in the DG (40 percent) are extremely similar to the mean DG offers (42 percent) of the pastoral Orma of Kenya (see Lesorogol and Ensminger, chapter 5), as are their levels of market integration (69 versus 72 percent, respectively).

Carolyn Lesorogol's Samburu study was one of only two of our studies (the other was Gwako's study of the Maragoli, chapter 12, available at: http://www.russellsage.org/Ensminger) in which the mean DG offers (40 percent) came in higher than the mean UG (35 percent). As per protocol, the same players were player 1 in both the DG and the UG in a long one-day session of play. In both cases the authors speculate that those who had been particularly generous in the DG may have decided to bring down their average offers by giving less in the UG. Lesorogol notes that all six of those who made hyper-fair offers in the DG reduced their offers in the UG, with an average decline of 32 percent. Nevertheless, it is worth noting that higher DG offers, compared to UG offers, have been reported using a different protocol, where this explanation does not hold (Henrich and Henrich 2007, ch. 8).

Perhaps the most interesting finding among the Samburu is their relatively low punishment in the UG and their high punishment in the TPG.

Lesorogol provides a plausible ethnographic explanation for this behavior. She explains that third-party punishment is common among the Samburu. The council of elders routinely adjudicates cases and imposes fines. The notion of a third party sitting in judgment over an exchange between two independent parties is highly familiar to the Samburu. For this reason, players may have comfortably taken on the role of the third party in the TPG and exacted fines against player 1 for perceived unfairness toward player 2. Like almost all of the other societies with high TPG punishment, the Samburu also live in moderately large communities (survey population: 2,000).

Our next study site, the town of Isanga in southwestern Tanzania, shares roughly the same high level of market integration (70 percent) as the pastoral groups, but shows slightly lower fair-mindedness in the DG (36 percent) and UG (38 percent). This is a mixed-ethnic population in which the largest ethnic group (the Nyakusa) makes up about 50 percent of the otherwise highly ethnically diverse population. The population is semi-urban (1,500 individuals) and located one mile from the regional capital of Mbeya. The majority are Christian, and the rest Muslim. Commerce, wage labor, service industries, farming, animal husbandry, and petty trading create great economic diversity in this peri-urban landscape.

As Richard McElreath points out at the beginning of chapter 15 (available at: http://www.russellsage.org/Ensminger), the fact that we find significant and predictable variation in prosocial behavior across human societies and communities does not necessarily mean that we should expect the same variables to predict variation within societies (Henrich et al. 2012). Even though they arise from individual-level decisions and psychologies, social norms and institutions are fundamentally group-level phenomena. Indeed, the evidence linking individual-level economic and demographic variables is weak or contradictory as we move across our sites. This applies to both phases 1 and 2. The question remains whether we fail to find robust predictive relationships at the individual-site level because they are not there, because our site-level sample sizes are too small (thirty in most regressions), or because there is too little variation in our key independent variables. In this study, McElreath is able to draw on a mixed-ethnic population with more variation in the key control variables than we typically find at other sites. He also applies rigorous statistical tests to the data and bootstraps the standard errors to better control for outlier effects.

His conclusion is that there is still no meaningful and consistent variation at the site level even under these conditions. This result is consistent with the general thesis of the project, which is that the institutional complexity that undergirds the development of a market economy and affords the possibility of peaceful cohabitation in larger communities is a characteristic shared broadly by members of a given community regardless of their individual demographics. This yields predictions of greater variation in prosocial behavior between societies than within societies.

Moving further up the scale of market integration, Juan-Camilo Cardenas (chapter 15, available at: http://www.russellsage.org/Ensminger) conducted experiments among the Afro-descendants occupying the Sanquianga region of the Pacific shores of Colombia. The Sanquianga (mean village size: 1,931) make their living logging and harvesting fish, shrimp, crabs, and mollusks for sale from the mangroves and coasts inside Sanquianga National Park. This population is highly involved in the market and purchases 82 percent of their daily food. Eighty-four percent of the population identifies as Christian.

The Sanquianga play exceptionally fair-mindedly in both the DG (47 percent mean) and the UG (48 percent mean). Cardenas interprets these findings by referring to the ethnography of this society, which exhibits constant sharing, especially among the neediest. When a family has bad luck in a daily fishing catch, neighbors invariably share their food. Indeed, it is the poorest in this community who are the most generous in the DG and the UG.

In addition to these exceptionally fair offers, the Sanquianga stand out for their UG rejection responses. Six of our societies demonstrate marked U-shaped curves in rejection behavior in the UG (the Au, the Yasawa, coworkers in Accra, the Sursurunga, and the Samburu)—that is, they punish unequal offers, both high and low. In Sanquianga and Accra (Barr, chapter 17, available at: http://www.russellsage.org/Ensminger), the tails of these rejection data are particularly steep: there is a high tendency to reject offers of both 0 and 100 percent, with declining rejection rates in both directions as they approach fifty-fifty from the extremes. Based on the data from the post-play questions, Cardenas discusses in detail the participants' own explanations for this behavior, which makes it quite clear that they understand what they are doing. Such U-shaped rejection curves have also

been observed by other researchers in Russia and China (Bahry and Wilson 2006; Hennig-Schmidt, Li, and Yang 2008).

Cardenas also compares his DG results to a modified double-blind experiment in which the players play in private and submit their offers in a sealed envelope (see also Lesorogol and Ensminger, chapter 5). He finds evidence of what looks like a small experimenter effect: DG offers shift downward from a strong mode of 50 percent to a strong mode of 40 percent. Hyper-fair offers also disappear. These results are similar to those from rural Missouri in which the nationality of the experimenter was also the same as that of the players. When the experimenters are complete outsiders to the community, as was the case for the Samburu and the Orma (Chapter 5), there is no statistically significant impact on DG offers in the double-blind treatment.

Our last two case studies are from fully market-integrated societies: urban wage-earners in Accra, Ghana (chapter 17, available at: http://www.russellsage.org/Ensminger), and rural wage-earners in Missouri (chapter 18, available at: http://www.russellsage.org/Ensminger). Both societies produce extremely high DG (42 and 47 percent, respectively) and UG offers (44 and 48 percent, respectively) and exhibit a high willingness to punish unfair offers, all of which is consistent with the prosocial behavior we expect of highly market-oriented societies.

Abigail Barr ran the experimental protocol with manufacturing employees of several enterprises that ranged in number from seventeen to eighty-nine employees. Ninety-six percent of these wage workers identify with a world religion, either Christianity or Islam. In this study, the small-scale "community" is composed of coworkers rather than villagers. Most are production workers, with a few apprentices and office personnel. Like most urbanites anywhere in the world, they are exposed to newspapers, radio, television, and a broad range of ethnic diversity.

The most striking finding from these data is the steeply sloped U-shaped rejection pattern from the UG, which parallels the same steep and symmetrical pattern among the Sanquianga (chapter 16, available at: http://www.russellsage.org/Ensminger). As Barr notes, this "suggests that the Ghanaian employees are averse to inequality even when that inequality is in their own favor." Barr does not find the same punishment pattern with respect to hyper-fair offers among the TPG players, but neither do any of our other sites that exhibit this pattern in the UG.

Barr's analysis adds a new dimension by examining the differences in behavior between those who were born in an urban environment and those born in rural Ghana who had immigrated to their current urban location. This test was designed to examine whether the resocialization of norms that occurs in the urban context is sufficient to override the original socialization from rural origins. Although the evidence points in that direction—the urban-born do make higher offers in all three games—the results are not completely conclusive statistically, except in the UG.

Barr also finds evidence in the regression analyses of an income effect. In all games, individuals with higher incomes make higher offers. Barr suggests two possible interpretations of this finding: either richer players are more generous because they know that they are better off, or the stakes mean less to them because of their higher income, so the cost of acting on their other-regarding preferences is lower for them. The only other society in which we find statistically compelling evidence of income effects for both DG and UG is the Tsimane' (chapter 8, available at: http://www.russellsage.org/Ensminger). Income is significant in the DG for Siberia (chapter 13, available at: http://www.russellsage.org/Ensminger), but not in the UG. Income is not significant in any of the other populations we have examined. Given that the Amazonian Tsimane' and the population of Accra have virtually nothing else in common, we are not inclined to make much of this result. As a predictor for the overall game data set, income is not robustly a large and significant predictor across games and model specifications.

Finally, in chapter 18 (available at: http://www.russellsage.org/Ensminger), Jean Ensminger and Kathleen Cook present findings from the early pilot project for the phase 2 work, conducted in the heartland of America. Rural Missouri was chosen for the U.S. comparison sample because it was possible to find a small community (population: 1,813) where people lived in a face-to-face social environment that fell in the community size range of our other communities in less market-oriented environs. Because this site was the pilot for phase 2, some changes were made to the choice of games and protocols, based on the experiences at this site. As a consequence, there are no TPG results from this site, and although the strategy method UG was conducted, responses to offers above 50 percent were not elicited.

Chapter 18 presents the findings from four economic experiments: the dictator, strategy method ultimatum, public goods, and trust games. Across all four experiments, the populations demonstrated quite high levels of prosociality in offers, rejections, and reciprocation of trust. As the United States represents the most extreme end of our market integration spectrum, and this Bible Belt population is virtually universally involved in a world religion, these findings of exceptionally high prosociality fall in line with the general tendencies demonstrated by the data across our entire project. Although the particularly high prosocial behavior observed in the games at this site contrasts somewhat with the results from many studies of undergraduates in university laboratories (including those in our own benchmark; see chapter 9, available at: http://www.russellsage.org/Ensminger), it is quite consistent with many studies of more representative adult populations from field studies in many areas of the highly developed world (Bellemare, Kröger, and van Soest 2008; Henrich, Heine, and Norenzayan 2010).

In closing this chapter, we would like to offer our sincerest gratitude to the individuals, families, and communities that opened their lives to us. In small appreciation, we will donate the royalties from this volume to Human Rights Watch. Most of us see imminent or conclusive signs that not only the livelihoods but also the rights of the indigenous societies we study are being seriously undermined. We support the efforts of Human Rights Watch and other organizations that are attempting to help indigenous populations in these struggles. We would also like to thank the MacArthur Foundation's Preference Network, which funded and supported our earlier work when it was highly “experimental,” and Stuart Plattner, whose tireless work at the National Science Foundation helped make phase 2 a reality. The Russell Sage Foundation provided generous support for the Missouri pilot experiments.

NOTES

1. We also included a trust game that was performed in only a subset of our societies. This was combined with social network data and has been published separately (Barr, Ensminger, and Johnson 2010).

2. The Orma (Lesorogol and Ensminger, chapter 5) were also part of phase 1.

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Chapter 2

Theoretical Foundations: The Coevolution of Social Norms, Intrinsic Motivation, Markets, and the Institutions of Complex Societies

Joseph Henrich and Jean Ensminger

Classical scholars long ago proposed a positive relationship between developed market economies and prosocial or fair-minded motivations in impersonal interactions (for an overview, see Hirschman 1982). One of the first and best-known scholars to write in this vein was none other than Adam Smith (1759/2000), whose position was consistent with the findings we present in this volume. Even before Smith, however, Montesquieu (1749/1900, 319) was explicit on this subject: “The spirit of trade produces in the mind of a man a certain sense of exact justice, opposite, on the one hand, to robbery, and on the other to those moral virtues which forbid our always adhering rigidly to the rules of private interest, and suffer us to neglect this for the advantage of others.”

Within the context of societal evolution, Montesquieu anticipated the specifics of the trade-off between narrow economic self-interest and other-regarding behavior that we examine throughout this volume. We compare societies with more and less commerce (market integration), and he anticipated the direction of our findings: there is more fair-minded behavior in more market-integrated societies. In the same vein, David Hume (1751/2006, 25) described the early social evolution of prosocial norms and institutions and anticipated the relationship of prosocial behavior and scale that we address in this chapter.

> Suppose that several families unite together into one society, which is totally disjoined from all others, the rules, which preserve peace and order, enlarge themselves to the utmost extent of that society; but becoming then entirely useless, lose their force when carried one step farther. But again suppose, that several distinct societies maintain a kind of intercourse for mutual convenience and advantage, the boundaries of justice still grow larger, in proportion to the largeness of men's views, and the force of their mutual connexions.

Though prescient, the early classical scholars did not have the benefit of quantitative evidence or comparative experimental measures and game theory to support their intuitions and casual observations. Further, predicting or observing a relationship is not the same thing as positing mechanisms of origin and maintenance. In this chapter, we outline the broader theoretical significance of our empirical project for understanding the coevolution of the particular social norms and institutions that eventually paved the way for the emergence of large-scale societies and massive economic growth. We begin developing a theory of social norms and institutions by drawing on converging lines of theoretical work arising from both evolutionary and economic frameworks. In developing this foundation, we consider evidence from sources as diverse as developmental psychology, social neuroscience, economic history, and anthropological ethnography. Building on this, we discuss how prosocial or group-beneficial norms arise and spread, and how this relates to the emergence of the more centralized and formal institutions that undergird the subsequent expansion of large-scale, complex societies.

THE EVOLUTION OF NORMS AND INSTITUTIONS

As empirical phenomena, anthropologists, sociologists, and others from across the social sciences have long noted the importance of social norms and institutions, often evoking norms or institutions to explain behavioral similarities within groups or to differentiate groups (Bendor and Swistak 2001; Bicchieri 2006; Sripada and Stich 2006). Despite broad usage and their seeming empirical importance, both the concept of social norms and its interrelationship with institutions have until recently lacked sufficient micro-level theoretical foundations to be taken seriously by researchers in the economic and evolutionary sciences.

In building a theoretical foundation, let's begin with a distinction between norms and institutions. *Norms* are mental representations stored in individual brains that got there through some form of learning, broadly defined (that is, they are not innate). Conceptually, depending on one's preference and disciplinary background, norms could be composed of a combination of preferences and beliefs, mental models (or scripts and schema) and motivations, or decision rules and expectations. In general,

these all aim to include (1) what people believe others will do in some context and (2) what they think they and others *ought* to do, as well as (3) varying degrees of internalized motivations (including none) to meet those expectations and to see others meet those expectations.

Institutions are emergent phenomena that arise at the population or group level from the individuals' interactions, decisions, and learning. They are first and foremost self-reinforcing, dynamically stable equilibria that arise as individuals' norms converge and complement each other over time. We will use the term “formal institutions” to label those institutions that are reified and enforced, or reinforced, by written laws, police, and external sanctioning mechanisms. This allows us to distinguish cases in which individuals' norms (for example, their expectations and motivations) do not match the local institutions, or in which the local (informal) institutions do not match the formal prescriptions of extrinsically supplied formal institutions (based on written laws).

Without at least plausible answers to key theoretical questions regarding how social norms and institutions emerge, why individuals adopt norms that violate their narrow economic self-interest, what “adopt” means, how individuals' decisions interact with group patterns, how norms and institutions spread across groups, and how and why norms and institutions have changed over human history, neither social norms nor institutions can be fully incorporated into either economic or evolutionary frameworks. In recent decades, however, approaches arising from both evolutionary biology and economics are converging on a “ground-up” or “first principles” explanation of social norms and institutions. There are now plausible theoretical answers to the above questions, and in some cases there is an abundance of such proposals (see, for example, Chudek and Henrich 2010).

Learning Social Norms

The first step in approaching norms from an evolutionary perspective is to use the logic of natural selection, aided by formal evolutionary modeling, to consider what kinds of learning strategies or heuristics individuals—be they humans, guppies, or rats (Galef and Whiskin 2008b; Lachlan, Crooks, and Laland 1998)—would evolve to adapt to uncertain, novel, or changing environments (Boyd and Richerson 1985; Schlag 1999; Wakano and Aoki

2006), including environments with social interactions (Guzmán, Rodríguez-Sickert, and Rowthorn 2007). These environments include social interactions in which information about the costs and benefits of alternative behaviors is costly, inherently uncertain, incomplete, or impossible to acquire. In such environments, these learning strategies, which include heuristics that integrate rules glossed as “copy the most successful” (prestige-biased transmission) and “copy the most common trait” (conformist transmission), can outcompete learning strategies that rely solely on the direct evaluation of perceived costs and benefits or innately specified repertoires (see, for example, Boyd and Richerson 1988; Henrich and Boyd 1998; Henrich and Gil-White 2001b; Schlag 1998; Wakano, Aoki, and Feldman 2004). This means that the direct evaluation of the costs and benefits of alternative actions is but one component in a suite of adaptive learning tools that permit individuals to calibrate to diverse informational environments. In this suite, direct cost-benefit evaluation is deployed and operates best in stable, well-structured (clear choices) environments with high informational content.

This line of evolutionary theorizing has led to many predictions about the kinds of learning rules or biases that individuals should use in calibrating their behavior to local environments. A substantial amount of evidence from both laboratory experiments and field observations supports these evolutionary predictions in humans—both in adults (Coultas 2004; Efferson, Lalive, and Fehr 2008; Henrich and Broesch 2011; Henrich and Gil-White 2001a; Henrich and Henrich 2007, ch. 2; Kameda and Nakanishi 2002; Kohler, VanBuskirk, and Ruscavage-Barz 2004; McElreath et al. 2005; McElreath et al. 2008; Mesoudi 2009) and in children (Birch, Akmal, and Frampton 2010; Birch, Vauthier, and Bloom 2008; Corriveau, Fusaro, and Harris 2009; Corriveau and Harris 2009a, 2009b; Chudek et al. 2013; Jaswal and Neely 2006)—and in other species (Day et al. 2001; Galef and Laland 2005; Galef and Whiskin 2008a; Lachlan et al. 1998).

The second step in building an evolutionary theory of norms and institutions is to explore what happens when individuals equipped with these evolved learning strategies are placed in a formal (evolutionary) game theoretical model that permits different kinds of social interactions. The results of many such efforts indicate that stable equilibrium states at the population level often emerge when interacting individuals are deploying adaptive learning strategies. The result is a stable behavioral pattern for a

given group. Moreover, such analyses often show that there are many different stable equilibrium states for a given situation. Which state emerges in a particular population is dependent on the initial conditions and details of particular shocks along the evolutionary path. In general, the existence and potential emergence of different stable states (that is, different group-level behavioral regularities) is amazingly robust across a variety of types of social interactions and different kinds of adaptive learning rules. The results begin to look like emerging social norms and institutions, at least in that these empirically grounded learning heuristics give rise to stable statistical regularities and behavioral prescriptions that vary across social groups.[1]

Matters get even more interesting when one considers social interactions in which an individual has the possibility of exploiting others, such as in a public goods situation or other larger-scale cooperative dilemmas. One might expect free-riding strategies to always dominate, but evolutionary learning models show that if individuals are using empirically grounded adaptive learning heuristics (prestige-biased and/or conformist transmission), then prosocial or group-beneficial norms of cooperation, exchange, and respect for others' property can be maintained, even when interacting groups are large and the possibility of repeated interactions is low. There appear to be a number of ways to sustain such individually costly (and group-beneficial) equilibria in a manner that solves the well-known second-, third-, and n^{th}-order free-rider problems. Two important solutions for our purposes involve (1) permitting individuals to learn strategies that punish or reward non-prosocial behavior (for example, selfish behavior), along with strategies that cooperate or not (Boyd and Richerson 1992b; Henrich and Boyd 2001; Kendal, Feldman, and Aoki 2006); or (2) linking via reputation any norm-violating behavior (individually costly behavior) to other types of social interaction (Panchanathan and Boyd 2004). Other solutions exploit signaling opportunities (Gintis, Smith, and Bowles 2001; Boyd, Gintis, and Bowles 2010), or combinations of cultural learning biases (Henrich 2009a).

One problem with these “prosocial solutions” is that the same mechanisms can stabilize any equally costly behavior, *independent* of its benefit to the group. Such mechanisms can stabilize behaviors in a group that hurt both the individuals themselves and the average payoffs of the group. This robust aspect of these mathematical analyses is problematic if

one is looking exclusively to solve the dilemma of large-scale cooperation or similar social dilemmas, since the cooperative solution is merely one among myriad others. For building a theory of norms, however, this oddity is a feature, not a bug, because it better reflects the world we actually observe.

In other words, these emergent phenomena are now looking even more like the norms and institutions recorded by social scientists: we have behavioral regularities stabilized by either direct punishment or indirect sanctioning (through reputational damage) that can be, but need not be, prosocial or group-beneficial. Anthropologists and sociologists have recorded a wide range of stable behavioral patterns that appear to be maladaptive (Diamond 2005; Edgerton 1992) but seem also to be enforced by concerns about reputational damage or informal punishment. Conspicuous examples include food taboos, Chinese foot-binding (Mackie 1996), supercision of adolescent males, cranial deformation in infants, ritual cannibalism of relatives that sustain prion diseases (Durham 1991), and female infibulation (Knight and Ensminger 1998). It is interesting that the same mechanisms that can theoretically account for the normative and self-reinforcing nature of these practices are the mechanisms that can explain cooperation in large groups, including management of property rights (Ostrom 1990) and economic exchanges among strangers in the absence of formal third-party enforcement (Ensminger 1992).

The Internalization of Norms

There is at least one major empirical aspect of norms that is missing so far from our “ground-up” development: the emotional, or motivational, aspect (Chudek and Henrich 2010; Sripada and Stich 2006). The desire to adhere to norms and to see them enforced appears to be internally motivated in some fashion. Once internalized, norms become ultimate ends, goals, or values in themselves. Economists would say these individuals have put the performance of the norm into their objective function (Greif 2006). By noting this, we emphasize that internalizing a norm does not make an individual a mindless “norm-executer.” People have plenty of competing internalized goals and motivations that demand choosing among alternative goals. Moreover, failure to comply with a norm on a particular occasion does not indicate a lack of any internalized motivations.

Why would natural selection build an organism that internalizes social norms as proximate motivations (Gintis 2004, 2007)? To approach this issue, the evolutionary analysis should focus on the costs of processing information and making errors (being sanctioned for violations or simply miscoordinating), the temptation of reaping immediate rewards, and the developmental circumstances of the adapting child. Natural selection may favor internalizing norms as ends in themselves if this saves on information-processing costs or reduces the associated errors. If norms are reliable and frequently sanctioned, an individual might be better off to "just do it" in many situations, motivated by norm adherence as a goal in itself or by a pre-evaluation decision rule that sometimes skips cost-benefit evaluations. "Just doing it" would thereby save the costs of performing for each slightly different situation a cost-benefit analysis that would have to include considering the probability of being judged in violation of a norm and the resulting long-term reputational damage or punishment. Moreover, suppose that each time one runs such mental calculations, actors pay costs to acquire information and occasionally make processing errors. Internal motivation or pre-evaluation decision rules can save the costs of information search and help one avoid the errors in inherently noisy environments.

In addition, internally motivated adherence to norms or pre-evaluation decision rules may be natural selection's way of psychologically overcoming the pull of an immediate reward versus long-term benefits. If people overweight immediate rewards compared to future rewards or rewards amortized over years, as many researchers argue they do (Berns, Laibson, and Loewenstein 2007; Frederick, Loewenstein, and O'Donoghue 2002; Laibson 1997), then internal motivation might provide that extra push to forgo the short-term gains in favor of the long-term payoffs. Natural selection or adaptive learning could fix this problem by adjusting our temporal discounting, but since many nonhuman animals have the same problem, we might assume that such temporal discounting biases either provide other benefits that preserve them or are subject to biological constraints that make it too costly to build a better discounter.

Finally, when organisms live in rapidly changing or variable environments, allowing proximate motivations to be internalized by learning can help the organism make adaptive decisions. To understand this, consider the acquisition of social norms from the perspective of children.

Since norms and institutions vary across groups but are generally locally stable, children can adapt to the local environment by first rapidly adopting and partially internalizing the local norms (pre-evaluation decision rule), thereby avoiding sanctions, and then begin evaluating the costs and benefits of norm violations once they have mastered the specifics of local norms, such as when the norm applies, how angry people get at violations, how much people monitor, and so on. The problem of errors in cost-benefit calculations is particularly acute for children since they lack the information possessed by adults to evaluate the consequences of violations, and many social rules protect individuals from environmental or social hazards (such as toxic substances, dangerous animals, or diseases).

Developmental work suggests that by adolescence, and often long before, children have much knowledge and have internalized many local norms. Children first acquire local norms in contextually specific circumstances and then rigidly apply them, before gradually, with observation and experience, adjusting the norms' domain of applicability. Later, having mastered the knowledge of a norm but perhaps not yet having *fully* internalized it, children start figuring out how and when they can violate it for their own benefit (Fiske 1998; Harbaugh, Krause, and Liday 2002; Henrich and Henrich 2007, ch. 2; Lancy 1996; Sutter and Kocher 2007).

One further perspective on how norms are learned and internalized deserves attention. The creation of explicit rules, formal institutions, and laws, as we discuss later for more complex societies, helps to coordinate people's beliefs about what norms are applicable to particular circumstances. Formalized rules also convey information about the incentives for adherence (sanctions); by influencing compliance, they may also influence the acquisition and internalization of learners trying to figure out what the local norms are (Cooter, Feldman, and Feldman 2008). Once internalized, social emotions (such as guilt, shame, and pride) can motivate norm adherence (Chudek and Henrich 2010; Chudek, Zhao, and Henrich, 2013).

The natural implication of this for our project is that the more highly developed these systems are, the better should be people's predictions about the behavior of others, and thus the lower should be the variance in compliance; the result is a virtuous cycle (literally, in the case of prosocial norms) of norm internalization and compliance. Iris Bohnet and Robert

Cooter (2003, 19) summarize how this notion has been debated by legal scholars:

> Our results bear on a disagreement among legal scholars about how law causes social change, such as the decrease in racial discrimination in the U.S. Some scholars argue that law has an "expressive function" that changes behavior, whereas other scholars deny that law has much influence on such phenomena as racial discrimination. Our research suggests that law changes society by changing beliefs more than preferences. According to this logic, laws imposing desegregation in the southern states may have changed behavior by changing beliefs about the willingness of others to integrate. Whereas beliefs changed relatively quickly, preferences probably changed relatively slowly.

Richard McAdams (2000, 1651) has also stressed the unique impact of law as a focal point for belief about how others will behave; as he puts it, "law works by what it says in addition to what it does." The emphasis here is on coordination via focal points (and information about what others believe and prefer). In this case, even sanctionless laws can serve this function by signaling information. The notion that social norms change behavior by changing expectations regarding the behavior of others and evoking context-specific preferences is also supported by the literature on framing effects in economic experiments (Camerer 2003; Ross and Ward 1996), which we discuss in more detail later in the chapter.

Experimental Support for Learning and Internalization of Norms

This theoretical foundation for social norms permits us to unify a diverse range of empirical findings. Here we briefly summarize four supporting lines of experimental work. First, much work from developmental psychology shows that prosocial norms are transmitted culturally, at least in the laboratory: children acquire individually costly prosocial behaviors via observational learning and automatically adopt sanctioning tendencies toward violators. Second, prosocial behavior toward strangers, as measured in economic experiments in the United States and Europe, develops gradually over the first two or three decades of life, unlike motivations and behavior related to prosociality toward kin and in dyadic reciprocity situations. Third, behavior in experiments depends on population-specific contextual cues that aid individuals in mapping the games to their local norms. And finally, economic games measure internalized norms: subjects'

prosocial behavior (cooperation, fairness, and punishment) in experimental games in the West activates the same reward circuits as does receiving direct cash payments; being prosocial in games is internally rewarding in the brain, even when costly.

Norms are transmitted culturally. Substantial research with children in the 1960s and 1970s shows that context-specific, prosocial norms for altruistic behavior toward strangers can be acquired by observing others behaving altruistically in the same context. When exposed to either adult or peer models who donated more tokens (which could purchase toys) to poor children, subjects between five and eleven years of age also donated more tokens themselves. These effects were (1) not influenced by whether the child was alone when making the donation decision, and (2) not ephemeral, as they endured in re-tests months later that did not include observations of models. The altruistic effects extended to somewhat similar tasks, but did not generalize beyond this. When placed in the role of model, child subjects continued to donate higher amounts and also spontaneously scolded younger children who did not donate sufficiently; this scolding behavior had not been previously modeled in the experiment. Recent work shows that even toddlers readily turn single observations of behavior into social rules and spontaneously sanction norm-violators (Rakoczy, Warneken, and Tomasello 2008; Rakoczy et al. 2010).

A comparison of methods reveals that exposing children to charitable models is the best method to induce charitable giving toward strangers, superior to rewards, exhortations, and direct instruction. Preaching and verbal instruction have little effect unless accompanied by costly donating actions by an adult or peer model (Henrich 2009a). Incentive schemes can induce prosocial behavior as long as the incentives persist, but they do not create internalized motivation. (In fact, they seem to inhibit internalization.) Natalie Henrich and Joseph Henrich (2007, ch. 2) detail these findings and provide references.

Economic games with children demonstrate that prosociality develops slowly over two or more decades. In experimental games similar to those used in this volume, research shows that Western children's offers begin to approach adult levels by around age twelve; then there is a drop or plateau during adolescence, when they deviate only somewhat from the fairness norm. In the ultimatum game, in which the responder can punish a low offer, giving lower offers is rationally self-interested because adolescents'

willingness to punish (reject) has not risen sufficiently high to discourage unfairness, as it will in adulthood (Ensminger and Cook, chapter 18, this volume, available at: http://www.russellsage.org/Ensminger; see also Henrich and Henrich 2007, ch. 8). Experiments done over the developmental trajectory for both Americans and Europeans indicate that prosocial behavior does not reach its adult plateau until the mid or late twenties (Harbaugh et al. 2002; Sutter and Kocher 2007; Fehr, Bernhard, and Rockenbach 2008). Moreover, the behavior of university students in experimental games continues to change from the first to the fourth year (Carter and Irons 1991), and in some experiments, such as the dictator game, the differences between students and fully socialized adults is dramatic (Henrich and Henrich 2007; Carpenter, Burks, and Verhoogen 2005). Jean Ensminger and Kathleen Cook (chapter 18, this volume, available at: http://www.russellsage.org/Ensminger) demonstrate the same phenomenon for the rural United States.

Norms are context-specific. This approach to norms gives us a means to anticipate and theorize about how different contextual cues in laboratory experiments, which have no direct impact on the payoff structure of the game, influence game play. Subjects arrive at experiments equipped with norms, which include contextually specific beliefs (expectations of others' behavior) and internalized motivations, and then face a novel situation. They have to figure out how to behave, in part, by figuring out which—if any—of their norms apply to the situation. Since most experimental games involve both money and anonymity, players from some societies with norms that apply to such contexts are influenced by both their norm-related beliefs (what they think others will do) and their internalized motivations, or pre-evaluation decision rules (such as what is “fair”).[2] These norm-effects come through when experimentalists set up the identical game (with the same payoff structure) but vary the language or some other aspect of the process. Lee Ross and Andrew Ward (1996), for example, used identical versions of a public goods game (a cooperative dilemma) and labeled one the “Wall Street” game and the other the “Community” game. They found that university students in the Wall Street game contributed less than those in the Community game (see also Hoffman et al. 1994; Pillutla and Chen 1999). In a different kind of variation, a variety of experiments show the positive effects on prosocial behavior of communicating before playing (Ostrom, Gardner, and Walker 1994). Communicating, even if not explicitly

about the game, can help players anticipate the norm-driven behavior of other players, thus facilitating norm-coordination (Janssen et al. 2010).

Nahoko Hayashi and her colleagues (1999) show that simple framing differences strongly affect rates of cooperation in an otherwise identical two-person prisoner's dilemma, *and* that these effects depend on whether the player is from Japan or the United States. This finding fits with observed differences between the United States and Japan in non-experimental contexts and shows that the same contextual manipulations yield different effects in different populations. (For interactions between contextual cues and societal differences, also see Goerg and Walkowitz 2010).

We emphasize here that we do not think that norms are the only thing influencing play in experimental games, or anywhere else. Other aspects of the games—such as the material costs and benefits, the possibility of cultivating a reputation, and the prospect of repeated interaction—ought to influence game behavior in predictable ways independent of the norms. Additionally, some contextual effects that do not influence the actual payoff structure probably affect game play by influencing players' perceptions of the possibilities for reputation formation or repetition (see, for example, Haley and Fessler 2005). Of course, such effects do not stand as evidence against internalized motivations.

Finally, by living in a group with shared behavioral standards, individuals come to acquire these norms as internalized motivations. Work in neuroscience and neuroeconomics has recently contributed to this line of theorizing by showing that behaving in the manner demanded by norms—cooperating, contributing, or punishing in locally recommended or prescribed ways—activates the brain's rewards or reward anticipation circuits in the same manner as when a direct cash payment is received (Fehr and Camerer 2007). Complying with local norms “feels good” to the brain in the same way that receiving cash does. Cooperating and getting money (from the cooperation) feels better—and activates reward circuits more—than just getting the same amount of money without this association (Rilling et al. 2004). Being fair feels better—and activates more reward circuits—than receiving the same amount of money while being unfair (Tabibnia, Satpute, and Lieberman 2008). Punishing by really hurting norm-violators (physically or monetarily) also activates these reward circuits (Sanfey et al. 2003) more than punishing symbolically (de Quervain et al.

2004). Giving money to charity activates the same reward circuits as receiving money (Harbaugh, Mayr, and Burghart 2007), even when the actor's own actions do not cause the charitable giving. Activations of the brain's reward circuitry in these experiments generally predict behavioral outcomes (Fehr and Camerer 2007; Sanfey 2007).

Convergence with Economics

Evolutionary and economic approaches have now begun to converge on both a unified conception of learning and a theoretical foundation for social norms and institutions. By considering the impact of incomplete information and uncertainty on rational decision-making, combined with the simplicity of ecologically rational heuristics for dealing with complex situations (Brandstatter, Gigerenzer, and Hertwig 2006; Gigerenzer and Selten 2001), bounded rationality is providing an improved understanding of human social behavior paralleling that derived through evolutionary theory (Gintis 2007; Young 1998). Economists have shown that copying successful people and copying the plurality are—under particular conditions—quite rational strategies (Ellison and Fudenberg 1993, 1995; Schlag 1998, 1999; Spencer and Huston 1993), as well as fitness-maximizing. Such strategies are rational when information is costly to acquire or process, or when information about the costs and benefits of alternative behaviors or strategies is noisy (error-ridden)—that is, these strategies are rational in circumstances common to many real-life decisions. Economists have also explored bounded learning strategies based on personal trial and error learning (Fudenberg and Levine 1998).

Theoretical models that place individuals deploying these learning strategies in social interactions yield stable behavioral patterns that look like norms. This is not surprising in some cases, since the underlying learning heuristics used by evolutionary theorists and economists are similar, but in other cases this finding reaffirms the phenomenon that learning plus social interaction robustly yields a wide variety of fairly stable outcomes (Weibull 1995; Young 1998). This multiplicity of stable outcomes is a feature of classical game theoretical models that assume perfect and free information and processing power, a finding enshrined in the folk theorem (Gintis 2000).

The emerging focus on bounded rationality and game theory has led to some of the best experimental work on learning in social interactions. The experiments confirm that, at least in the laboratory, learners do appear to be using learning heuristics like “copy the successful” and “copy the plurality,” as well as following experienced-based learning rules (Apesteguia, Huck, and Oeschssler 2007; Camerer and Ho 2000; Pingle 1995; Pingle and Day 1996; Selten and Apesteguia 2005). Many of these findings converge with work in psychology, using quite different experimental tools, as well as with findings from field observations (see Henrich and Henrich 2007, ch. 2; Mesoudi 2009).

In returning to the inspirations of Adam Smith and others, economists are beginning to explore and theorize about the internalization of norms, or endogenous preference formation, and have specifically considered the effect of markets (Bowles 1998). Rather than waving off the question of where people's preferences come from, an increasing number of economists are examining the possibility that preferences emerge in part from interactions with the local institutional environment. As Avner Greif (2006, 37) puts it, “internalized norms are socially constructed behavioral standards that have been incorporated into one's superego (conscience), thereby influencing behavior by becoming part of one's preferences.” Textbooks in micro economics are also beginning to take the need to consider internalized motivations seriously (Bowles 2004). People's motivations or preferences partially calibrate in adapting to and performing in the local equilibrium, and these calibrations and preferences show durability (Alesina and Fuchs-Schundeln 2007; Francois and van Ypersele 2009; Nunn 2009). This means that history matters.

Scholars in the law and economics tradition have taken a particular interest in the internalization of social norms. Cooter (1996) has repeatedly emphasized that social norms are uniquely distinct from formal laws, in that they are socialized within individuals and thus become self-enforcing. Cooter does not dispute that we often have reputational reasons for abiding by social norms, or that individual members of societies may also impose external sanctions on norm-violators in the form of gossip and even ostracism. But as Cooter notes, to dwell on these aspects of social norms is to miss one of their unique features: we internalize social norms, including a sense of guilt (or other social emotion) should we violate a norm that we believe to be morally just (Cooter 1996, 152). Similarly, as we saw in our

discussion of neuroeconomics, people also get “mental rewards” from seeing a norm-violator punished. Thus, social norms internally propel us (at least some of us) to engage in behavior that is not in our narrow economic self-interest. This also means that we may abide by norms even when no one is looking—for instance, in an anonymous economic experiment. Indeed, Cooter (2000, 1581) operationalizes a definition of the degree of internalization of a norm as the price one is prepared to pay to conform to it, which dovetails nicely with economic experiments that are designed to measure exactly that cost dimension of behavior.

Although economics does not generally concern itself with ultimate explanations of motivations or preferences, some efforts within economics have paralleled and even inspired some of the evolutionary explanations discussed here based on error management. If norm violations result in sanctions or miscoordination, individuals should develop internalized motivations (preferences) that allow them to avoid norm violations that will cost them in the long run (Frank 1988).

Multiple Mechanisms of Norm Stabilization

As noted earlier, there is a growing list of ways to stabilize costly norms and institutions, including group-beneficial ones. Earlier models solved the free-rider problem in larger-scale cooperative dilemmas by permitting the transmission (learning) of both cooperative and punishing strategies. The higher-order free-rider problem created by the cost of punishing was solved by a meta-punishing strategy (punish all nonpunishers) or by learners using a combination of learning strategies under uncertainty, including some conformist learning (Axelrod 1986; Boyd and Richerson 1992a; Henrich and Boyd 2001; Kendal et al. 2006). This approach can have direct observers of violations do the punishing and spread reputational information about violations to create broader diffuse punishment, or it can allow those best positioned to punish to administer the sanctions. Thus, these approaches can work in the absence of reliable reputational information if direct observers of norm violation perform the sanctioning (Henrich and Henrich 2007). Herbert Gintis, Eric Alden Smith, and Samuel Bowles (2001) and Robert Boyd, Gintis, and Bowles (2010) provide models that explore how signaling might sustain costly punishment and how this might in turn sustain costly norms.

More recent models illustrate alternative routes to stable norms that do not involve costly punishment; these routes involve linking costly individual actions in larger-scale situations (for example, doing something costly to contribute to a group benefit) to a two-person interaction in a different social context. Karthic Panchanathan and Robert Boyd (2004), for example, show how costly norms can be stabilized by attaching players' reputations in a dyadic helping game to their reputations in a larger-scale, individually costly interaction. If an individual fails to “cooperate” (perform the costly action) in the larger interaction, he gets a “bad reputation,” and other individuals can withdraw their help from him in the two-person game *without* getting a bad reputation themselves. Otherwise, individuals who refuse to help those with good reputations in the two-person helping game get a bad reputation and lose the help of others in the two-person game. There is no free-rider problem here because individuals “sanction” by withdrawing help, thus avoiding the costs of delivering help. Straightforward, narrow self-interest can drive sanctioning, so there is no costly punishment. Maciej Chudek and Joseph Henrich (2010) provide a more detailed discussion of various models that do not involve diffuse costly punishment.

These mechanisms provide different routes to stable social norms and institutions. As we argue in chapter 4, however, unlike models involving direct costly punishment, they require well-functioning, high-fidelity, reputational systems. Therefore, while such sanctioning regimes can explain some norms in some groups, including prosocial norms, they cannot support cooperation and fair exchange with those outside the reputational system—for example, in interactions in larger populations with strangers.

Cooter (1997) and Fehr and Gintis (2007) have argued that internalized norms make people more willing to directly punish norm-violators at a cost because they believe the normative behavior is the right thing to do. As we shall see in chapter 4, our findings suggest that this intuition applies only to norms sustained by diffuse costly punishment mechanisms and not to other kinds of sanctioning systems. We return to this debate in light of our findings and consider the circumstances in which the claim holds empirically. People internalize, in some sense, the local institutional forms.

THE SPREAD OF PROSOCIAL NORMS AND INSTITUTIONS ACROSS POPULATIONS

Once a combination of expectations, motivations, and beliefs converges in a group to create an institution, we have a somewhat sticky situation. When different societies, or groups, converge on different social norms, owing to the aforementioned path dependence or historical specificity of the process, is that the end? This problem is made even more poignant because, as we have already argued, models of norms indicate that many different norms can be stable and that most of these are not prosocial or group-beneficial. So what we have is a bunch of different groups, each with different norms, only a few of which involve any prosociality among strangers. Selecting among these norms becomes the classic problem of *equilibrium selection*, an important challenge that emerges in both dynamic evolutionary approaches (Henrich 2006; Samuelson 1998) and those rooted in classical concepts of rationality (Harsanyi and Selten 1988).

At least three broad theoretical approaches confront the problem of equilibrium selection. We label these: (1) stochastic stability, (2) forward-looking decision-making, and (3) cultural group selection. The first approach is based on the stochasticity inherent in any real population (Young 1998). Different stable equilibria (institutions) are more or less susceptible to this stochasticity, meaning that in the long run some equilibria will be substantially more common than others because some institutions will be more likely to collapse and cause the group to evolve to a different institution. Over time, differences in the sizes of the basins of attraction among equilibria will gradually lead groups to aggregate at the equilibrium with larger basins of attraction. This force is most important in relatively small groups, as they are more susceptible to such stochasticity (Kendal et al. 2006).

The second theoretical approach, and perhaps the most intuitive, is that rational, forward-looking individuals recognize the long-term payoffs available at stable cooperative equilibria, assume that others are similarly sensible, and choose the prosocial state (see, for example, Harsanyi and Selton 1988). The main problem with considering this mechanism as a dominant force is that as one looks across time and space, the world and human history are full of non-prosocial, and even downright antisocial, norms and institutions that hurt the group as a whole (Edgerton 1992).

Nevertheless, these three equilibrium selection mechanisms are not mutually exclusive, so this kind of mechanism is likely to be part of the story. Groups sometimes change norms quite consciously by meeting and reaching consensus, although actual cases suggest that they consciously adopt the norms of other more successful groups (Boyd 2001), making this a form of cultural group selection. Moreover, there is a tendency to focus on group decisions that yield beneficial outcomes as examples of foresight, but when they are placed in context with all the bad group-level decisions, luck rather than foresight seems the more probable cause.

The third mechanism, cultural group selection, results from competition among societies at different stable equilibria. Where population pressure and intergroup competition is absent, we see many examples of norms and institutions sustaining non-prosocial behavior. Where intergroup competition is strong, we see the spread of norm-bearers and/or practices and beliefs from groups stabilized at equilibria that favor success in intergroup competition, which includes institutions and norms that sustain large-scale cooperation, in-group harmony, and fairness among ephemeral interactants. In humans, competition between groups can take the form of warfare, demographic success, biased migration, or more subtle forms in which individuals learn decisions and strategies by observing and copying higher-payoff individuals—some of whom are from groups with higher-payoff norms and institutions (Fehr and Fischbacher 2003; Henrich 2004). This between-group learning can lead to a differential flow of decisions, strategies, and even preferences from higher- to lower-payoff groups (Boyd and Richerson 2002; Henrich and Boyd 2001), or it can lead to differential migration (Boyd and Richerson 1990), favoring the spread of the high-payoff norms (Boyd and Richerson 2009).

There is both laboratory and field evidence supporting cultural group selection. In the laboratory, Özgür Gürerk, Bernd Irlenbusch, and Bettina Rockenbach (2006) permitted players to choose between one of two different "institutions." In the first institution, players could contribute money to a group project. All contributions were increased and divided equally among all players, regardless of their contributions. Previous experiments (Fehr and Fischbacher 2003) have established that when this interaction is repeated, average contributions to the public good drop to near-zero (a "noncooperative equilibrium"). The other "punishing" institution is very similar, except now, after players have contributed, they

can pay to punish (reduce the payoff) or reward other players. When this interaction is played repeatedly (Fehr and Gächter 2000), a substantial fraction of players punish low contributors, causing mean contributions to rise and to stabilize near full cooperation (a "cooperative equilibrium") among samples of Western undergraduates (Herrmann, Thoni, and Gächter 2008). Both of these laboratory institutions were run concurrently for thirty interactions, and both initially and after each subsequent interaction (after seeing others' payoffs), players could choose their institution for the next interaction.

The principal findings of Gürerk and his colleagues (2006) can be summarized simply: initially most players picked the institution *without* sanctioning possibilities. But in response to being exploited by free-riders, cooperators in the nonpunishing institution began to reduce their contributions, and that began to drive total contributions toward zero. Meanwhile, punishers in the sanctioning institution started driving contributions up, despite the personal cost of punishing. After a few interactions, players from the nonsanctioning institution—presumably seeing the higher payoffs of those choosing the sanctioning institution—increasingly switched institutions. Despite the incoming flow of migrants from the nonsanctioning institution, the mean contributions in the sanctioning institution consistently increased or held stable near full cooperation. In fact, most incoming migrants, consistent with local norms in their new setting, increased their contributions during their first interaction in the sanctioning institution, and a majority administered some costly punishment.

What does this tell us about equilibrium selection? First, the student subjects' expectations of others' behavior did not permit them to foresee the final outcome and select the higher-payoff institution on the first interaction (Ertan, Page, and Putterman 2009). This occurred despite the simplicity of these experiments compared to the real world. Most players selected the lower-payoff institution, perhaps out of distaste for the possibility of being punished. Second, despite the stochasticity of human decisions, neither institution drifted into another equilibrium. There were only thirty interactions in this game, so one could hardly expect stochastic processes to begin selecting equilibria. But that is the point: observational learning and cultural group selection across institutions occur much faster than stochastic processes. What did happen is that once players from the lower-payoff

institution observed the higher payoffs of the other institution, they wanted to adopt the practices of that institution, or the decisions and strategies of those other players. In this experiment, players could do that only by “migrating” to the other institution. These migrants, however, did not appear to be merely uninformed payoff-maximizers who needed to adjust their beliefs about others. A majority of migrants into the sanctioning institution not only cooperated in their new institution but also punished (cooperating but not punishing is the payoff-maximizing strategy). Formal evolutionary modeling of the influence of success on migration and the spread of group-beneficial equilibria converges with these experimental findings (Boyd and Richerson 2009).

Outside the laboratory, there are now many lines of empirical evidence to support cultural group selection, including data from archaeology, history, and ethnography. For example, using detailed quantitative ethnographic data, Scott Atran and his colleagues (2002) have shown how conservation-oriented ecological beliefs spread from locally prestigious Itza Maya to Ladinos in Guatemala, and how highland Q'eqchi' Maya, with tightly bound cooperative institutions and commercially oriented economic production, are spreading at the expense of both Itza and Ladinos. In New Guinea, Joseph Soltis, Robert Boyd, and Peter Richerson (1995) have shown that even the slowest forms of cultural group selection (conquest) can occur on five-hundred-to one-thousand-year time scales. In Africa, using detailed ethnohistorical data, Raymond Kelly (1985) has demonstrated that differences in cultural practice regarding bride-price fueled the Nuer expansion over the Dinka, and that different social institutions, underpinned by cultural beliefs about segmentary lineages, provided a decisive competitive advantage. Similarly, Marshall Sahlins (1961) has argued that cultural beliefs in segmentary lineages, which facilitated both the Nuer and Tiv expansions, have spread this social institution in different parts of Africa. At the global level, Jared Diamond (1997) has made a cultural group selection case for the European expansion after AD 1500, as well as for the Bantu, Chinese, and Austronesian expansions. Using archaeological data and cultural phylogenetics, anthropologists are increasingly arguing for the importance of cultural group selection in prehistory (Currie and Mace 2009; Flannery and Marcus 2000; Spencer and Redmond 2001), including competition among foragers (Bettinger and Baumhoff 1982; Young and Bettinger 1992).

Recent work suggests that religions and rituals that galvanize group solidarity and deepen communities' mutual commitments can spread by cultural group selection (Henrich 2009a; Atran and Henrich 2010). For example, Ensminger (1997b) examines the spread of Islam in Africa. Islam is known to have spread particularly fast along the long-distance trade routes of Africa and South Asia. Conversion facilitated participation in trading networks (the group benefits). Although people may have originally been attracted to the economic benefits of conversion, there is no doubt that they also fully internalized the norms and belief systems of the religion, which worked to everyone's advantage as they forged honest trading partnerships in which contracts were honored, thus vastly expanding the Islamic trade routes and simultaneously lowering transaction costs for all.

Up to this point, we have been largely concerned with the results of decentralized actions by individuals and the learning mechanisms they employ in acquiring norms and adapting to their social environment. In the historical record, of course, we also have many instances of important changes in social norms and institutions that were driven by bigger players possessing substantial economic or political power.

It is important to recognize a continuum between the most informal and the most formal of institutions—those with written laws, formal adjudication procedures, and so on—and to consider how they influence equilibrium selection. Societies vary dramatically in the strength and complexity of their centralized decision-making institutions. Such institutions can, by their very nature, influence other institutions and their associated norms. Some groups, like the Machiguenga of the Peruvian Amazon, lack any significant higher-level institutions. Many foragers and horticulturalists have at least a community-level meeting in which individuals seek to build consensus on proposed changes. If consensus is reached, changes can be made, but little compels compliance after the meeting, since achieving consensus does not mean internalizing motivations. We expect all the same factors to be at play at all levels of sociopolitical complexity. The existence of strong central decision-making institutions, however, backed by external sanctions and written laws, can raise the level of agreement, coordination, consensus, and enforcement achieved prior to and during experimentation with novel institutions.

In their writings about the Orma in Kenya, Ensminger and Knight (1997) and Knight and Ensminger (1998) provide examples of how bigger players

(elites) can influence institutional shifts in a decentralized society. In these cases the relative bargaining power of the individuals leading the innovation in social norms can make a difference. A change in the norm of clan exogamy (rules mandating marriage outside of one's clan) spread because of the relative bargaining power of those few individuals initiating the change. The authors argue that people in the society were less likely to sanction norm-violators of greater wealth and status, thus affording such people a greater ability to innovate social norms (either for their personal gain or to suit their values) without being sanctioned. People often did not wish to forgo future interactions (including marriage) with such people and would weigh such action differently than they would if the violators were less pivotal in the social network. But other efforts by elites to change norms requiring female circumcision failed, owing to poor coordination. Similarly, Mackie's (1996) example of Chinese pledge societies that were involved in foot-binding eradication also involved elites as prime movers.

Moving along the continuum of sociopolitical complexity past typical hunter-gatherer and horticultural societies, we find societies with councils of elders, formal chieftains, and the polities of archaic and modern states. At this end of the spectrum, coordinated and centralized innovation of institutions may occur more regularly. It is here, we argue, that one is most likely to encounter coordinated manipulation both for strategic distributional ends and for the benefit of collective action in the interest of the common good, or success in intergroup competition (which are not always the same thing). However, in noting the importance of decision-making institutions, we do not wish to deny the fact that in many situations, even within the most centralized societies, it is the strength of local norms, not the force of formal institutions or laws, that governs behavior. In the developing world with which we are concerned, the sanctioning power attached to breaches of local social norms may be considerable, while the reach of state institutions is often limited and their legitimacy poorly internalized.

Economic history provides numerous examples of top-down “innovations” in institutional structures that have led to considerable economic prosperity (Greif 2006; North and Weingast 1989). Among ethnographic examples, Ensminger and Knight (1997) have examined the process by which sedentary elites in a herding society managed to engineer a gradual change in the property rights institution from one of common

grazing to one involving more restrictive access that eased environmental degradation and favored sedentary elites (for additional examples of property rights change, see also Ensminger 1997a; Ostrom 1990).

Whether such institutional changes favored by elites or central political authorities should be understood as strategic foresight for individual or group gain, the imitation of more successful groups with similar practices—or merely a lucky guess that supplies variation to the engine of cultural group selection—depends on examining particular changes within a broader historical and multi-group context. It is easy to mistake lucky guesses or cross-group imitation for foresight, especially given the unintended consequences of so many well-motivated social engineering efforts (Henrich 2009b).

The converging evolutionary and economic approaches described thus far suggest that different social norms, whether they arise from rational decision-making or some evolved adaptive learning processes, will emerge in different places and contexts, leading members of different groups to calibrate their beliefs and internal motivations differently. If our experiments are measuring norms for dealing with strangers in monetary exchanges, our theorizing here leads us to expect three features. First, we expect variation across populations in both our measures of fairness and punishment for interactions with anonymous others (Henrich et al. 2004). This prediction stands in contrast to approaches that take students' behavior in experimental games to be a robust universal feature of our species and the product of cognitive adaptation favored by repeated interactions (Hoffman, McCabe, and Smith 1998; Nowak, Page, and Sigmund 2000). Second, this variation across populations ought to be bounded by theoretically possible, dynamically stable equilibria, and it should favor equilibria that are group-beneficial. Thus, although variation is expected, it is not that “anything goes” cross-culturally. We do not expect societies with normative expectations that favor, for example, giving one's entire windfall to an anonymous other. Societies tolerate much maladaptive behavior, especially in noncompetitive situations such as those associated with low population pressure, but societies subject to cultural group selection tend to possess prosocial norms that maintain harmony, extend exchange, and sustain large-scale collective action. Third, we expect to observe a relationship across populations between the social institutions (like markets

and religion) and social norms for dealing with strangers, as measured in our games.

In the next section, we argue that a group's social norms influence how markets and other complex institutions operate, especially in large populations. Social groups with norms and institutions that facilitate trust, fairness, and cooperation in contexts involving strangers or in low-frequency interactions succeed in establishing institutions that achieve higher payoffs or are more competitive in intergroup competition. Similarly, larger groups that employ direct costly punishment for violations of such norms are more competitive. These differences in group payoffs or competitiveness favor the coevolution of the associated norms via one of the equilibrium selection mechanisms described here.

MARKETS, COMPLEX SOCIETIES, AND THE NORMS THAT MAKE THEM WORK

There is remarkably little consensus on two different, though inherently related, questions that researchers from diverse disciplines have confronted. The first is traditionally an anthropological question (Diamond 1997; Johnson and Earle 2000; Nolan and Lenski 2004): until about ten thousand years ago, our ancestors lived in relatively small, nomadic, or semi-sedentary, populations dependent on hunting and gathering for subsistence. In the ensuing millennia, sedentary agriculture arose in several places, then larger towns emerged, then cities. The scale and intensity of human cooperation and exchange expanded dramatically during what, in human evolutionary terms, was a relatively short time. How can a species adapted to living in relatively small foraging groups, often dependent primarily on kin relationships, expand the sphere of cooperation and exchange to such an extent in such a short time? And why did this seem to occur at different rates on different continents (Diamond 1997; Richerson and Boyd 1998, 1999; Hibbs and Olsson 2004)? The second question, one of critical humanitarian importance in the modern world and one that has long animated economic thinkers even before Adam Smith took up the challenge, asks: why are some societies rich and others poor?

Respected scholars from a variety of disciplines have diverse perspectives on these critical questions. Hypotheses concerning the role of climate, geography, and factor endowments generally have a long history as

explanations of differential development, and they have recently been further elaborated in various ways by Jared Diamond (1997), Jeffrey Sachs (2001, 2003), Louis Putterman (2008), David Landes (1998) and Douglas Hibbs and Ola Olsson (2004). Explanations that emphasize seemingly immutable advantages or obstacles, such as geography, may seem to focus more on the fortuitousness (or not) of inherited circumstances than on that which is humanly engineered, such as the institutions of property rights that many believe undergird and incentivize durable economic growth (North 1981, 1990; North and Thomas 1973). The work of Stanley Engerman and Kenneth Sokoloff (1994) and Daron Acemoglu, Simon Johnson, and James Robinson (2001) adds further nuance by emphasizing the interaction effect between the original endowments and specific institutions.

In contrast to the focus on both factor endowments and institutions, scholars such as Gregory Clark (2007), Jean-Philippe Platteau (2000), Thomas Sowell (1998), Robert Putnam (Putnam, Leonardi, and Nanetti 1993), and Douglass North (2005), as well as modernization theorists of the 1950s and 1960s (for example, McClelland 1961), have stressed the role of cultural practices, beliefs, and values in the process of economic development and wealth generation. The theoretical framework for the evolution of social norms and institutions that we have laid out here is consistent with some of the arguments made in this literature, but we believe that better specification of the mechanisms and substantiation with experimental and ethnographic evidence alter the specific substantive predictions and clarify this line of theorizing.

One way in which our data bear on the literature relating beliefs and values to economic growth has to do with religion. Religion plays a role in both our theory of the evolution of societal complexity and our data (Atran and Henrich 2010). Anthropologists have long noted a positive relationship between societal complexity and the presence of high moralizing gods. Religions in small-scale societies, especially foragers, often lack the omniscient moralizing gods of world religions (Johnson 2005; Roes 1995; Roes and Raymond 2003), who actively reward and punish proper behavior. For example, the idea that attaining a blissful afterlife could be contingent on proper moral behavior in this life is not found in traditional small-scale societies, and does not emerge in the historical record until 500 B.C. (McNeill 1991). Societies with high moralizing gods have spread dramatically, as have their beliefs, in the last two thousand years. Henrich

and his colleagues argue that cultural group selection has favored certain religious beliefs and rituals (Atran and Henrich 2010; Henrich 2009a; Shariff, Norenzayan, and Henrich 2010). Our analyses in this volume indicate, independent of a wide variety of other factors like income, wealth, market integration, and settlement size, a positive relationship between practicing a world religion (Catholicism, Islam, or Protestantism—evangelical and non-evangelical) and prosocial behavior toward anonymous others.[3] This is consistent with a variety of findings that have begun to delineate the relationship between faith, world religions, and prosociality (Norenzayan and Shariff 2008).

Another tradition close to what we propose here has focused on the consequences of institutional change as the driver of economic growth and development. In particular, Nathan Rosenberg and L. E. Birdzell (1986), North (1981, 1990), Greif (2006), and Acemoglu, Johnson, and Robinson (2002) have considered the evolution of institutional forms, including the development of property rights, as crucial for understanding differential global development. Acemoglu and his colleagues (2002) have argued that the reversal of economic fortunes in many regions after AD 1500 resulted from an interaction of European institutional forms with well-developed existing indigenous institutions. Where complex institutions already existed, imperialists exploited them to extract wealth. Where they did not exist, European institutions were imported, and these favored economic growth after the Industrial Revolution.

These diverse perspectives on the differences in the fortunes of nations are not mutually exclusive and can be linked by examining the first question—the evolution of societal complexity since the beginning of the Holocene epoch. Consider the origins of agriculture. Certain geographical regions had better combinations of natural endowments in the form of more easily domesticated grains and animals, as well as climates better suited to cultivation, population expansion, and long-term settlement (Diamond 1997). But as empirical data suggest, sustaining relatively stable, harmonious, large, sedentary settlements built around fixed resources (land, water, and pasture) requires at least some agreement on rudimentary property rights, access agreements, storage systems, and defensive collaborations before cereal agriculture can take off (North 1981). It appears likely that at least in some regions the technical know-how of domestication was poised for a takeoff long before the norms and

institutions existed that incentivized the costs and risks of planting and nurturing a crop through to harvest. Working out cooperative property rights or defense capabilities may have taken far longer than culturally evolving the technical routines and know-how of stable productive agricultural packages (North 1981; Richerson and Boyd 2000; Richerson, Boyd, and Bettinger 2001). This is an example of the iterative, coevolutionary process that we are describing.

Merely learning to live together in large settlements with significant numbers of nonkin long enough to sow and reap a harvest may have required the development of norms of fairness that facilitated group organization and decision making. Initially, such authority systems may have been nothing more than diffuse consensus among elders with the legitimacy to settle the disputes and diffuse the strains that arise from cohabitation and divisions of surplus. The development of more elaborate religious beliefs with professional specialists may have facilitated such submission to authority (Wright 2009) and made the potential or imagined consequences of violations more effective. Ethnographically, many groups, including some of the societies we have studied, lack such religious professionals and do not linger in large settlements, as disagreements and dispute cause dissolution. They also do not submit to authorities above the head of household (Henrich 2000; Johnson 2003; Johnson and Earle 2000).

The implementation of more intensive farming practices may have had to wait for the social and institutional systems to catch up (Richerson, Boyd, and Bettinger 2001). The problem is not dissimilar from what we observe in the modern world today. Clearly, there are many societies that are aware of, and sometimes in possession of, the technological capacities of the higher-performing economic systems that they wish to emulate, but have not yet acquired the institutional capacity and cultural capital to do so (Herrmann et al. 2008; Clark 2007).

Expanding the division of labor and trade, sustaining effective political and judicial decision-making, controlling corruption, and maintaining public safety and effective policing all require the evolution of a variety of norms and institutions for interacting prosocially to solve the inherent collective action problems that arise in interacting with strangers or low-frequency partners. As laid out earlier, coevolving norms and institutions provide a menu of potential solutions. Groups, or their norms, tend to spread because they allow larger populations to achieve higher payoffs in

the competitive ecologies of other groups. Such norms can, and did, spread, probably by some version of the equilibrium selection mechanisms discussed here. But these processes are often slow, stochastic, and reversible, and they also often lead to the eventual collapse of specific societies (Diamond 2005).

Part of this process involves the emergence of the norms and institutions that permit mutually beneficial market exchanges among strangers or low-frequency partners. Certain forms of market exchange and their associated norms for dealing with strangers coevolve. Groups with norms that allow profitable exchange among ephemeral interactants achieve, on average, greater success than those societies lacking such norms. These market norms can spread as individuals, impressed by its success, seek to join the group and adopt its norms (just as they did in the experiment conducted by Gürerk and his colleagues), or as members of other groups adopt the norms of the successful groups and shift the balance of their own group toward new norms and institutions. Successful groups may proliferate demographically, as did early Christians and Muslims (Levy 1957; Stark 1997), or the successful group may apply its excess wealth to military or commercial expansion, as has happened throughout history the world over. At the same time, markets and related institutions developed elsewhere can spread into groups already possessing sufficiently appropriate or applicable norms (even if suboptimal), though markets do not spread readily into groups lacking the appropriate norms without the operation of one of the equilibrium selection mechanisms discussed here. One implication of this reasoning is that more market-integrated societies ought to, ceteris paribus, have more prosocial norms for dealing with strangers, anonymous others, and low-frequency exchange partners.

Independent of markets, members of larger populations suffer from the daily need to interact with, cooperate with, not steal from, and exchange with other individuals well beyond their own circle of friends and family. Sustaining larger populations requires similar prosocial norms, though if the population is not too big, reputation can sustain the norms in the absence of direct costly punishment (Panchanathan and Boyd 2004). Thus, we predict a relationship between settlement size and punishment behavior in our experiments. Large populations require costly punishment to sustain prosocial norms, while small populations can use either reputation or costly punishment. Using classical game theory, Avinash Dixit (2004, 76) has

formalized this proposition and argues that it is systems of intermediate size that are at the greatest disadvantage, operating as it were between the advantages of face-to-face direct reputation-based systems and those at the other end of the institutional spectrum with strong mechanisms of third-party enforcement. This is consistent with ethnographic work in New Guinea indicating that communities lacking complex social institutions tend to break up as community size exceeds about three hundred (Forge 1972; Tuzin 2001). Our findings attest to this in the sense that diffuse costly punishment principally occurs in communities of more than twelve hundred people.

MOVING AHEAD

In this chapter, we have laid out a theoretical framework, together with experimental and empirical literature to support it, in which we attempt to explain the mechanisms by which certain kinds of prosocial norms can arise in the simplest of human societies. From there we describe the means by which we believe prosocial behavior can proliferate in a virtuous cycle of reinforcement as institutional structures become more complex. We recognize that multiple equilibria persist, and that many, if not most, are not group-beneficial. But as societies come into competition with one another, those where individuals and groups have drifted or designed their way into equilibria that stabilize higher levels of prosocial behavior have selective advantages over their neighbors. Quite commonly, aspects of successful systems are recognized and copied by neighbors, but never with exactly the same result, given path dependence. The level of economic exchange that is supported by complex societies today has its foundation in the earliest human societies, where some prosocial behavior is also maintained. But as institutions become more complex, they have the capacity to specify, internalize, and enforce higher levels of prosocial behavior that can allow societies to realize the economic benefits of overcoming diverse and substantial collective action challenges.

We believe that the data from this project are consistent with the mechanisms, described here, by which social norms and institutions evolved through human history. Our experiments were designed to test for the existence and strength of social norms for sustaining mutually beneficial exchange relationships, maintaining in-group harmony, and facilitating

collective action among unrelated individuals. Our findings from the first phase of this project (Henrich et al. 2004; Henrich et al. 2005a, 2005b), now replicated and extended in this second phase with new experiments, sites, and samples, indicate a positive relationship between prosocial behavior and market integration, as well as a positive relationship between settlement size and the punishment of norm violations.

The sample of societies from which we draw the data for this project is virtually unique in that it runs the gamut from almost pure hunter-gatherers (absent most traces of modern development and material possessions) through numerous horticultural and nomadic herding societies (some equally remote from modern markets), to cash-cropping farmers, urban African workers, and small-town residents in rural America. As such, it offers a rare opportunity to address some core questions about the coevolution through time among social norms governing fair-minded behavior, institutional complexity, and level of market integration.

NOTES

1. This approach also recognizes and explores the influences of “representational content” (the content of what is socially learned) on transmission as well as the impact and importance of inferential processes in understanding imitative learning (Henrich and McElreath 2003). For a debate on the evolutionary foundations of conformist transmission, see Nakahashi (2007), Guzmán et al. (2007), and Nakahashi, Wakano, and Henrich (2012).

2. See Ensminger (2004) for an example of a public goods experiment that did not use any specific framing but nevertheless was immediately labeled the “harambee game” by local participants, who were reminded of the local institution of public goods provision. Behavior in the game tracked the locally accepted behavioral pattern: the wealthy made higher contributions to the public good, as local social norms dictated for the analogous institution. In contrast, in the dictator game, which triggered no particular local institutional reference, the wealthy did not contribute statistically more than others.

3. Notably, the relationship that we find does not support Weber (1958), who is the best-known proponent of the relationship between religion and commercial development. In our data, Protestants are not more prosocial than others.

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Chapter 3

Cross-Cultural Methods, Sites, and Variables

Jean Ensminger, Abigail Barr, and Joseph Henrich

When we began phase 2 of this project, we had the benefit of four years of experience working together in a large collaborative effort involving many diverse societies around the world. Much had been learned in phase 1 concerning what would be most theoretically interesting to investigate, what was feasible across sites, and what could go wrong. We were fortunate to be able to include the expertise of many of the original phase 1 field researchers (Abigail Barr, Jean Ensminger, Michael Gurven, Joseph Henrich, Natalie Henrich, Frank Marlowe, Richard McElreath, and David Tracer) and would add several new recruits to the final phase 2 team (Clark Barrett, Alex Bolyanatz, Juan-Camilo Cardenas, Edwins Laban Gwako, Carolyn Lesorogol, and John Ziker). Having the expertise of seasoned researchers was essential to the success of the project, which was considerably more complicated and required more coordination than we had mobilized in phase 1. It worked to the advantage of the project that many of the returning researchers also changed or added new research sites: Accra City for Barr, rural Missouri for Ensminger, and Yasawa, Fiji, for Joe and Natalie Henrich. Altogether, eleven of the fifteen sites studied in phase 2 were new sites. Importantly, however, we retained the Hadza (Tanzania), Tsimane' (Bolivian Amazon), and Au (New Guinea), where some of the more exciting findings of phase 1 had emerged. Together with the nine sites from phase 1 that were not revisited in phase 2, we now have game data from twenty-four sites (see photo 3.1 for a photograph of the phase 2 team and advisers).[1]

During phase 1, virtually all of us were inexperienced at running economic experiments, which made it difficult to anticipate the many and varied practical challenges we would face in the field. For example, merely acquiring sufficient change (large numbers of small bills or coins) and safely moving it were challenges in environments remote from banks and law enforcement. Most problematic in phase 1 was the failure to anticipate many of the logistical challenges that we would face. Overcoming these obstacles

required some creative, on-the-fly “innovations” that, while creating problems with comparability and interpretation in phase 1, provided valuable insights when we set about designing testable hypotheses, tightening protocols, and more rigorously measuring key variables in phase 2.

After receiving our National Science Foundation grant, but before the bulk of the phase 2 experiments began, the team sat down together at a marathon workshop at the California Institute of Technology in 2002 to hammer out instructions and protocols that we thought could stand up to the logistical variations we would confront across our diverse sites. We also had the benefit of pilots that had been run in rural Missouri and among the Orma and the experiences of many on our original team who had run additional experiments on their own between the phase 1 and phase 2 projects. This workshop also served as a training exercise for the new members of the group. In this chapter, we detail the sampling strategy, site descriptions (including sociodemographic data), operationalization of the variables, game protocols, and scripts that made up the framework around which we coordinated the project.

PHOTO 3.1 *The Phase 2 Research Team and Advisers at the California Institute of Technology*

Source: Photo by Stuart Plattner.
Note: 2004 (our postgame meeting), starting left: Bolyanatz, Cardenas, Gwako, Patton, Johnson, Harris, McElreath, Henrich, Ensminger, Marlowe, Barr, Wilson, Tracer, Gurven, Barrett, and Lesorogol.

SUMMARY GAME DESCRIPTIONS

Our core strategy centered on conducting three behavioral games across our diverse swath of societies. We ran three one-shot bargaining games: the dictator game (DG), the strategy method ultimate game (UG), and the third-party punishment game (TPG). In phase 1, we used a standard "direct elicitation" version of the ultimatum game; thus, using the strategy method, which elicited responses to all offers, permitted us to extend our previous work. The DG was added to provide a purer measure of fairness, without the threat of rejection that is present in the UG. As described later, we played the DG and UG back to back, using the same players in the same roles, with the DG always preceding the UG.[2] The TPG was played using different players

in most cases. The TPG built naturally on the setup of the dictator and ultimatum games, giving another measure of fairness and a measure of a different kind of costly punishment.

In the dictator game, two anonymous players are told that a sum of money (the *stake*) has been allotted to them as a pair. The first player—player 1—can offer a portion of this sum to a second player, player 2, and offers are restricted to 10 percent increments of the stake. In the DG, each player is told the total size of the stake given to the pair, and each is paired with an anonymous player; player 1 has the job of deciding how the stake is to be divided between the two players. Player 2 is passive in this game and merely receives what is offered. In this one-shot anonymous game, a purely income-maximizing player 1 would offer 0 percent; thus, offers in the DG provide a measure of a kind of behavioral fairness that is not directly linked to reciprocity, reputation, or the immediate threat of punishment.[3]

In the ultimatum game, once again, two anonymous players are told that a sum of money (the stake) has been allotted to them as a pair, and that player 1 can offer a portion of this sum to player 2 (Güth, Schmittberger, and Schwarze 1982). In this case, however, player 2 can either accept or reject the offer. If player 2 accepts, the sum is divided in accordance with player 1's decision. If player 2 rejects, both players receive zero.

In phase 1, we played the UG as described. In phase 2, however, we applied the strategy method to player 2. Before hearing the actual amount offered by player 1, player 2 has to decide whether to accept or reject each of the possible offers, and these decisions are binding. If player 2 specifies that he or she will accept the amount of the actual offer, then he or she receives the amount of the offer and player 1 receives the rest. If player 2 specifies that he or she will reject the amount actually offered, both players receive zero. If people are motivated purely by income-maximization, player 2s will always accept any positive offer; knowing this, player 1s will offer the smallest nonzero amount.[4] Because this is a one-shot anonymous interaction, rejections of positive offers provide a measure of player 2's willingness to engage in costly punishment; we refer to this as *second-party punishment* in this chapter and the next.

Some experimental social scientists have proposed that the strategy method affects decision-making. Taking the UG as an example, the suggestion is that an individual who receives an offer of *x* and chooses to either reject or accept that offer might make a different decision if he or she

is asked, “What would you do if you were offered *x?*” and *x* is one in an array of possible offers. However, empirical evidence is mixed on this claim. While Werner Güth, Steffen Huck, and Wieland Müller (2001), Andrew Schotter, Keith Weigelt, and Charles Wilson (1994), and Jeannette Brosig, Joachim Weimann, and Chun-Lei Yang (2003) found significant inconsistencies using different experimental designs, Timothy Cason and Vai-Lam Mui (1998), Jordi Brandts and Gary Charness (2000), and Robert Oxoby and Kendra McLeish (2004) found no inconsistencies. (Oxoby and McLeish used a protocol most similar to our own.) In a recent meta-analysis, Brandts and Charness (2011) found that the strategy method affects some types of decisions more than others. In particular, less punishment is observed when the strategy method is applied. This needs to be borne in mind when our data are compared to those from other studies. However, note that it does not undermine our endeavor, which is to make comparisons across individuals and societies using data that were collected with the same methods across each society. Indeed, the strategy method improves comparability, as it ensures that each individual placed in the responding role responds to the same set of *possible* stimuli. When responses are directly elicited, the actual stimulus applied to each responder varies in accordance with the distribution of offers made by proposers. Note also that in several cases we can compare our phase 1 “direct elicitation” approach with our phase 2 “strategy method” approach using samples drawn from the same populations.

We discovered during a pilot experiment in rural Missouri that player 2s tended to misunderstand the nature of the UG and engage in what appeared to be “demand” behavior. In other words, some players thought that they were actually influencing player 1‘s behavior by their rejections. To drive home the fact that player 1 had already made the offer, we wrote player 1's offer on a piece of paper and placed it upside down in front of player 2. Then, as we ran through the eleven possible offers that player 1 might have made and elicited player 2's acceptance or rejection, player 2 was reminded that the actual offer made by player 1 was already marked on this piece paper (which would be flipped over as soon as player 2 made all of his or her responses to potential offers) and that his or her corresponding acceptance or rejection would be binding.

In our third game, the third-party punishment game, two players are allotted a sum of money (the stake), and a third player gets one-half of this

amount. Player 1 must decide how much of the stake to give to player 2 (who makes no decisions). Then, before hearing the actual amount that player 1 allocated to player 2, player 3 has to decide whether to pay 20 percent of his or her allocation to punish player 1 across each of all possible offers; if player 3 pays to punish, 30 percent of the stake is deducted from the amount that player 1 kept for himself. For example, suppose the stake is \$100 (so player 3 is initially allocated \$50): if player 1 gives \$10 to player 2 and keeps \$90 for himself, and player 3 says she wants to punish player 1 for making this offer, then player 1 takes home \$60 (\$100 − \$10 − \$30), player 2 \$10, and player 3 \$40 (\$50 − \$10). If player 3 had instead decided not to punish an offer of \$10, then the take-home amounts would be \$90, \$10, and \$50, respectively. As in the UG, we applied the strategy method: we elicited responses from player 3 to the complete range of possible offers by player 1—again with the existing offer from player 1 to player 2 written on a piece of paper placed in front of player 3 as she made her decision.

In this anonymous one-shot game, a purely income-maximizing player 3 would never pay to punish player 1. Knowing this, an income-maximizing player 1 would always offer zero to player 2. Thus, an individual's willingness to pay to punish provides a direct measure of his or her taste for another type of costly punishment, *third-party punishment*.

The original TPG was designed by Ernst Fehr and Urs Fischbacher (2004). In their design, player 3s could *buy* as much punishment (fining) as they wished, given their budget constraint, paying one-third of a monetary unit for every monetary unit of the fine. Based on our experience conducting behavioral games among subjects with little or no education, we chose to simplify the game by limiting the fining options. Even with this change, of our three games, the TPG took the longest amount of time and the highest number of examples to achieve comprehension (see Henrich and Henrich, chapter 9, this volume, available at: http://www.russellsage.org/Ensminger). Scripts for these games can be found at the end of this chapter and at http://jee.caltech.edu/research/experimental-economics.

EXPERIMENTAL PROCEDURES

We standardized our protocols and scripts to ensure uniformity across sites in a number of important dimensions. First, as in phase 1, to encourage motivation and attention we standardized the stake at one day's wage in the

local economy. This is much higher than the stake typically used in university labs. Second, using the method of “back-translation” (discussed later), all of our game scripts were administered in the local language by fluent speakers. Third, our protocol design restricted those waiting to play from talking about the game and from interacting with players who had just played during a game session. Fourth, we individually instructed each participant using fixed scripts, sets of examples, and preplay test questions. This guaranteed that all players faced the same presentation of the experiments and that they understood the game well enough to correctly answer two consecutive test scenarios. Fifth, researchers were required to obtain representative samples of participants from their communities. (Sometimes this led to all of the adults from a small community being involved.)

TABLE 3.1 *Samples Sites and Mean Market Integration*

Society	Market Integration (Percentage of Diet Purchased)	Society	Market Integration (Percentage of Diet Purchased)
Hadza	0%	Dolgan/Nganasan	63%
Au	1	Samburu	69
Tsimane'	7	Isanga	70
Yasawa	21	Orma	72
Shuar	22	Sanquianga	82
Sursurunga	24	Accra, Ghana	100
Gusii	28	Rural Missouri	100
Maragoli	43	Mean all MI1	46

Source: Authors' compilation based on author data.
Note: MI1 = Percentage of diet purchased in the market.

SITE SAMPLE SELECTION

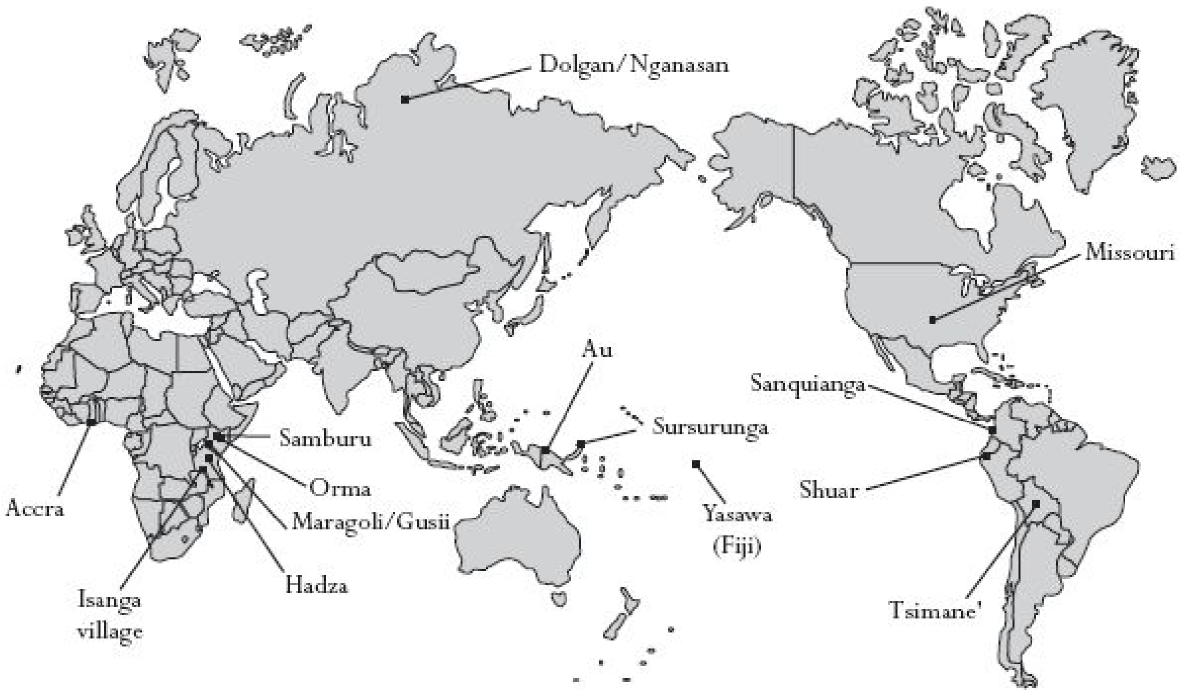
In designing phase 2, we hypothesized (as in phase 1) that market integration would be a crucial variable in explaining fair-mindedness and punishment behavior. Thus, we were cognizant of needing variation in market integration as we attempted to build a sample; however, there was a considerable degree of opportunism in our selection of researchers. We needed seasoned researchers with particular scientific skills, and preferably with long-term field sites at which they would be capable of executing a complex protocol. We also needed researchers eager and available to undertake the research within a relatively tight time frame. These severely limiting constraints

narrowed the candidates to a small number of anthropologists and an even smaller selection of economists. This resulted in a geographically unbalanced, but nevertheless highly diverse, sample of small-scale human societies.

It was never our objective to construct a globally representative sample of either individuals or communities. Our goal was to construct a sample that spanned the range of variation in institutions, such as the market, and in supporting institutions, such as the rule of law, as well as capturing different types of economic systems (foragers, herders, subsistence farmers, cash-cropping farmers, and so on). Given that our new formal measure of market integration—which was defined as the percentage of the daily caloric intake purchased in the market, as discussed later—would not be calculated for each site until after we had sent the researchers to the field, we had to rely on informed guesswork when designing the sample. This approach worked well: our sites nicely span the full range from 0 to 100 percent of daily caloric intake being purchased in the market. The mean level of market integration for each of our phase 2 sample sites, as measured by the percentage of calories purchased in the market, is shown in table 3.1. Given the constraints described earlier, this probably represents as good a distribution across the spectrum as we could have hoped to achieve in the absence of such measurements ex ante.

In our site selection, we also gave consideration to geographic and ethnolinguistic distributions, lest we confound our sample with an overrepresentation of unique geographical or cultural idiosyncrasies. As in phase 1, we achieved considerable geographic and ethnolinguistic dispersion (see figure 3.1). We have seven African societies, two Papua New Guinean, one Oceanic, one Siberian, three Latin American, and one rural North American. Africa has greater representation in this phase of the project, just as Latin America was more prominent in phase 1. However, our African cluster includes great diversity: one fully urban population (Accra), one peri-urban farming society (Isanga), two rural cash-crop farming societies (Maragoli and Gusii), two pastoral societies (Samburu and Orma), and one hunter-gatherer population (Hadza). Regrettably, given resource and time constraints, we were not able to find an appropriate experimenter for East Asia who was available during the required time frame.

FIGURE 3.1 *The Global Distribution of Our Populations*



Source: Authors' figure.

In one significant respect, we went out of our way to alter the sample selection from the criteria discussed earlier. In phase 1, David Tracer (2003, 2004) produced an unusual finding among the Au and the Gnau of Papua New Guinea. In the ultimatum game, a number of people made offers of greater than 50 percent of the stake, and many of these offers were rejected. Tracer interpreted these findings as culturally consistent with the social norms of a New Guinea gifting society, where people attempt to put others in their debt by giving out unsolicited gifts. By refusing such high offers, the Au and the Gnau were reflecting internalized motivations or preferences associated with resisting such indebtedness. We found this result intriguing, though it ran counter to our overall market integration findings because the Au and the Gnau are not highly market-integrated, yet this practice led to quite high offers in the UG. The Au were retained in the sample during phase 2 of the project, and we decided to include another society from New Guinea—from the Melanesian island of New Ireland, part of Papua New Guinea—to see if similar patterns would emerge there as well. Consequently, Alex Bolyanatz (chapter 11, available at:

http:/www.russellsage.org/Ensminger) was recruited and ran experiments with the Sursurunga, who are located quite geographically far away from the Au, and are ethnically and linguistically distinct as well, but who share this cultural “gift-giving” trait. This deviation from our overall sampling strategy paid off. Tracer replicated his earlier findings for the Au (see chapter 7, available at: http://www.russellsage.org/Ensminger), and Bolyanatz found that the Sursurunga behaved in the same unusual manner (chapter 11, available at: http://www.russellsage.org/Ensminger).

Since these two sites represent two out of our sample of fifteen, we significantly over-represented Papua New Guinean societies in our world sample, and because findings there ran counter to our overall finding of a positive relationship between market integration and fairness, these two sites raised the bar required for us to statistically identify the relationship between market integration and fairness, though once again, we did do so (see chapter 4).

Our sites span the spectrum of human variation in market integration and degree of incorporation in modern states. Many of our small-scale societies are sufficiently remote that the formal institutions of the states in which they reside have minimal impact. For example, primary education is legally mandated in Kenya, but only one-third of school-age Orma girls attend school; female circumcision is also illegal in Kenya, but it is universally practiced among the Orma, as it is among many other Kenyan ethnic groups. In many of the remote populations we studied, the state has neither the will nor the institutional capacity to enforce its authority. Local norms and institutions still predominate in many of these societies, and these norms are reflected in the variation in behavior within the games that we see across societies. Table 3.2 summarizes the ethnographic characteristics of our sample societies.

SAMPLING WITHIN SITES

Some researchers already had censuses for their sites. Others had to generate them in order to draw a random sample of adult participants for the experiments. In deference to community norms of fairness, some researchers limited the draw to one per family until all families were included, and then allowed random selection of second family members. In societies where large numbers of residents were involved in inflexible work schedules that

might preclude attendance, an effort was made to schedule games at times that would be convenient for more people. People were generally enthusiastic about participating in the study, and all but a few of the selected individuals participated. Overall, our samples are highly representative of the communities from which they are drawn (though among the Au many women declined; see chapter 7, available at: http://www.russellsage.org/Ensminger).

Foraging and Horticultural Societies

Not surprisingly, the societies in our study that are most remote from national institutions tend also to be those most reliant on subsistence production; they also tend to live in small communities and to represent very small ethnic groups. The Hadza of Tanzania (Marlowe, chapter 6, available at: http://www.russellsage.org/Ensminger) are our only purely foraging society: the population subsists on their own hunting and gathering production for most (90 percent) of their calories. Their camps average about thirty people and are quite nomadic, moving four to ten times per year. The Hadza do not practice a world religion.

Two of our other societies that rely on foraging are also dependent on horticulture for many of their calories, and to varying degrees they engage in some household-level cash-crop farming as well. The Au of New Guinea (chapter 7, available at: http://www.russellsage.org/Ensminger) and the Sursurunga (chapter 11, available at: http://www.russellsage.org/Ensminger) of New Ireland (an island province of Papua New Guinea) are also our two “gifting” societies. The Au depend mostly on foraging and to a lesser degree on food produced in their small slash-and-burn gardens; they are a five hours' walk from the nearest market. But the Au do devote about 50 percent of their land to cash-crop farming and engage in some wage employment, demonstrating some of the complexities that begin to confound a simple categorization of even highly remote, small-scale societies. The Sursurunga also subsist primarily on swidden agriculture and also grow some cash crops, but unlike the Au, they purchase 24 percent of their foodstuffs in the market. A highway bisects many Sursurunga villages, so this population has easier access to a market center. Both the Au and the Sursurunga in our sample are close to 100 percent evangelical Protestant, though like most of our populations, their complex of supernatural beliefs and ritual practices

represents a syncretic blend of indigenous beliefs with those brought by Christian missionaries.

TABLE 3.2 *Ethnographic Summary of Societies in the Study*

Group	Nation/Region	Language Family	Environment	Economic Base	Residence	Researcher
Accra City	Ghana	Mixed	Urban	Wage work	Sedentary	Barr
Au	Papua New Guinea/ Torricelli	Torricelli/Wapei	Mountainous tropical forest	Foraging/horticulture	Sedentary	Tracer
Dolgan/Nganasan	Russia/Siberia	Turkic/Samoyedic	Tundra-taiga	Hunting/fishing/wages	Semi-sedentary	Ziker
Gusii	Kenya	Ekegusii	Fertile high plains	Mixed farming/wage work	Sedentary	Gwako
Hadza	Tanzania	Khoisan/isolate	Savanna-woodlands	Foraging	Nomadic	Marlowe
Isanga	Tanzania	Bantu	Mountainous forest	Agriculture/wage work	Sedentary	McElreath
Maragoli	Kenya	Logoli	Fertile plains	Mixed farming/wage work	Sedentary	Gwako
Orma	Kenya	Cushitic	Semi-arid savanna	Pastoralism	Semi-nomadic	Ensminger
Samburu	Kenya	Nilotic	Semi-arid savanna	Pastoralism	Semi-nomadic	Lesorogol
Sanquianga	Colombia/Pacific Coast	Spanish	Mangrove forest	Fisheries (fish, clams, shrimp)	Sedentary	Cardenas
Shuar	Ecuador/Amazonia	Jivaroan	Tropical forest	Horticulture	Sedentary	Barrett
Sursurunga	Papua New Guinea/ New Ireland	Austronesian	Coastal tropical island	Horticulture	Sedentary	Bolyanatz
Tsimane'	Bolivia/Amazonia	Macro-Panoan isolate	Tropical forest	Foraging/horticulture	Semi-nomadic	Gurven
United States, rural Missouri	United States/rural Missouri	Germanic	Prairie	Wage work	Sedentary	Ensminger
Yasawans	Fiji/Yasawa Island	Austronesian	Coastal tropical island	Horticulture/marine foraging	Sedentary	Henrich and Henrich

Source: Authors' compilation.

The Tsimane' of Bolivia (Gurven, chapter 8, available at: http://www.russellsage.org/Ensminger), like the Hadza and the Au, depend on the market for little of their daily food. The Tsimane' still acquire about 30 percent of their food from hunting, fishing, and gathering and depend on swidden farming for almost all of the rest. The Tsimane' in our sample are 50 percent Catholic and 50 percent evangelical Protestant. The Shuar (Barrett and Haley, chapter 10, available at: http://www.russellsage.org/Ensminger), our second Amazonian population, have historically lived a lifestyle similar to that of the Tsimane', with low population density and household units loosely clustered in hamlets. This has recently changed considerably with the encroachment of roads and towns, and the current economic situation of the Shuar is very much in flux as greater access to markets has changed the local economic and settlement patterns. However, this process is far from played out: the Shuar still purchase only 22 percent of their food and depend on their own hunting, gathering, and horticultural production for the rest. Our Shuar sample is roughly 50 percent non-evangelical Protestant and 25 percent Catholic. The remaining 25 percent do not self-identify with

Christianity and presumably maintain indigenous religious beliefs. They are one of our most religiously diverse samples.

The inhabitants of the island of Yasawa in the northwest corner of the Fijian archipelago complete our sample of forager/horticultural societies (Henrich and Henrich, chapter 9, available at: http://www.russellsage.org/Ensminger). Like the Shuar and the Sursurunga, Yasawans depend on the market for approximately one-quarter of their calories. The rest comes from fishing, horticulture (sometimes requiring slashing and some burning), and marine gathering. Yasawans are fairly isolated from national spheres of administration, including courts and police, and have their own local-level governing institutions (simple chiefdoms). Wage work tends to be scarce, though some opportunities for trading and employment in the tourist industry are present for those few with the requisite skills. Yasawans are roughly two-thirds non-evangelical Protestants (Methodists) and one-third evangelical Protestants (Assemblies of God), though their supernatural beliefs also include traditional ancestor gods and spirits.

Farming and Wage Work

Three African societies make up our sample of sedentary, non-slash-and-burn farming populations, with limited or no dependence on foraging. These populations are quite distinct in many other respects from the foraging and horticultural populations. They depend on the market to a much greater degree, and they are more highly educated. The Gusii and the Maragoli of Kenya (Gwako, chapter 12, available at: http://www.russellsage.org/Ensminger) both inhabit productive agricultural zones that lend themselves to cash-crop farming. The Maragoli suffer from severe population pressure that has forced them to rely on education as a means toward wage employment, as the land cannot support future generations in agriculture. The Gusii in this sample are significantly richer than the Maragoli in all respects, and they also have high education levels. Because the land is highly productive, both groups purchase a relatively low percentage of their diet (28 and 41 percent, respectively) for such highly developed societies. Our Gusii sample is 100 percent evangelical Protestant, and our Maragoli sample is 100 percent non-evangelical Protestant.

The ethnically mixed residents of Isanga Village (McElreath, chapter 15, available at: http://www.russellsage.org/Ensminger) in Tanzania inhabit a peri-urban community. This community is only a mile from the regional capital of Mbeya, a major center of trade and commerce. Despite the peri-urban environment, most residents of Isanga still farm small plots that provide roughly 30 percent of their food needs. The rest is purchased in the market using money earned from their significant involvement in wage work and business activities. The Isanga sample is roughly 10 percent Muslim and 90 percent Protestant of mixed denominations.

Livestock Herders

Three populations make up our sample of societies that depend largely on livestock herding. All have histories of being nomadic, and all have similar levels of market dependence of around 70 percent, near the high end of our sample. Our Siberians are drawn primarily from two ethnic populations, the Dolgan and the Nganasan (Ziker, chapter 13, available at: http://www.russellsage.org/Ensminger), who historically were, respectively, reindeer pastoralists (who also hunted and traded) and reindeer hunters. Today they live a largely sedentary life in town and all depend on local hunting, fishing, trapping, and a combination of wage work and state-provided social security pensions. While the Dolgan are Russian Orthodox, the Nganasan maintain an indigenous set of religious beliefs.

Our other two pastoral societies come from Kenya, and their subsistence activities are similar, though their ethnolinguistic origins are completely different. The Samburu of Kenya (Lesorogol, chapter 14, available at: http://www.russellsage.org/Ensminger), who are closely related to the better-known Maasai, are Nilotic, while the Orma of Kenya are Cushitic and trace their origins to the Oromo of Ethiopia (Lesorogol and Ensminger, chapter 5). Both groups herd cattle, small stock, and small numbers of camels. Among both groups, many families today are largely sedentary, though their herds and young men are not. Families typically supplement their lifestyles by trading livestock, engaging in local and migratory wage employment, and running other local trading businesses. Both societies purchase approximately 70 percent of their calories. Like the Shuar, the Samburu are religiously diverse: 48 percent of our sample are Catholic, 14 percent are non-evangelical Protestant, and 34 percent practice their indigenous religion.

The Orma made a 100 percent conversion to Islam early in the twentieth century.

The Extraction of Natural Resources

One of our societies, the Sanquianga of Colombia (Camilo-Cardenas, chapter 16, available at: http://www.russellsage.org/Ensminger), depends on extracting natural resources in the form of logging mangrove poles and harvesting shrimp, clams, and fish. The population is heavily involved in trading activities and purchases 82 percent of its daily calories. Despite this, the population is not particularly well educated or much involved in wage labor. This Afro-Colombian population actually resides inside what is now a national park, and as a consequence, there are increasing efforts on the part of the national government to regulate their activities. The Sanquianga are predominantly Catholic, and this is reflected in our sample: 74 percent are Catholic, 10 percent are Protestant Christian (predominantly evangelical), and the remaining 16 percent did not self-identify with any world religion.

Industrial Societies

We have two industrialized populations: one from an urban site in a developing country, and one from a rural site in the United States. Our sample from Accra, Ghana (Barr, chapter 17, available at: http://www.russellsage.org/Ensminger) is different from our other samples in that it is not drawn from a residential community but from the work communities in small firms in the city of Accra. The experiments were carried out in small firms among largely urban immigrants in an ethnically diverse, bustling city of 2 million inhabitants who are entirely dependent on the market for their subsistence and have ready access to public transportation, newspapers, radio, and television. However, the effects of government regulation on their wages and working conditions vary markedly depending on whether they are working for a formally registered company or a small, informal enterprise. The population of Accra is religiously diverse, and this is reflected in our sample: 46 percent are non-evangelical Protestant, 30 percent are evangelical Protestants, 10 percent are Catholic, 10 percent are Muslim, and 4 percent stated that they had no religion.

Our second fully market-integrated sample comes from rural Missouri in the United States (Ensminger and Cook, chapter 18, available at: http://www.russellsage.org/Ensminger). This sample was drawn from a town, with a population of 1,800, where virtually all families are known to each other. The town is in the heart of the Bible Belt, and our sample is all Christian. Despite their location, farming is actually a relatively rare form of livelihood; most depend on wage work or small business employment, and a few commute to large cities for work.

We also ran our experimental protocols on American undergraduates at Emory University (Henrich and Henrich, chapter 9, available at: http://www.russellsage.org/Ensminger). For comparability with our community-based samples, our DG and UG samples were drawn from residents of the same undergraduate dormitory (roughly the same size as many of our villages) in the same manner that we sampled from residential communities elsewhere. Note that we did not include this undergraduate sample (largely freshmen) in our synthetic cross-population analyses because the prosociality observed in behavioral experiments continues to develop through the university years and up to age thirty (Bellemare, Kröger, and van Soest 2008; Henrich 2008; Sutter and Kocher 2007). Mixing these socially immature individuals with our random samples of adults would confuse age-related developmental differences with other sources of variation. We have included them in this volume as a point of reference for our three games, since most other experimental work is done with Western undergraduates (Henrich, Heine, and Norenzayan 2010).

OPERATIONALIZING KEY VARIABLES

Our earlier work had led us to anticipate that we would not find significant effects for many common demographic variables that might be intuited as explanations of societal variation in fairness and punishment (Henrich et al. 2005), but we considered it important to test and control for such effects. The key variables that we wished to control for were age, sex, education, household size, wealth, and income. We hypothesized that behavior in the experiments would be related to market integration, and based on Marlowe's findings (2004) and our phase 1 aggregate analyses (Henrich et al. 2005), we expected that community size might also play an important role, so we were careful to measure these variables for all of our sites.

Age, Sex, and Education

In some of our societies, age is not precisely known but can usually be estimated using well-established anthropological techniques, often in consultation with other community members who know relative birth orders and can relate these to known historical events or the births of individuals with known birth dates. We measured age in years. Sex was recorded for all participants by observation.

For education, some of our researchers interpreted years of education to mean the level completed, and others interpreted it as the total number of years attended (including repeated grades). Any difference here would create only a small discrepancy among sites owing to the small number of individuals who had to repeat grades. Since one year of formal education, measured either way, was not equivalent across sites, we standardized our education measures by subtracting the mean value of education in the population and dividing by the standard deviation in education for each population. This allowed us to make the best use of within-population variation.

Household Size, Wealth, and Income

We defined a household as a group of people who share in the household estate—that is, a corporate body of people who might or might not live together (including absent school children, for example), but who share some household accounts, and whose members are subject to some decision-making authority by the head or heads of household. The number includes absent members because such individuals may make future claims (for example, for land, livestock, school fees, or bride-wealth) on the estate. It might also include large extended families. For example, polygynous households are often under the decision-making authority of one person with the power to buy and sell land or livestock. Similarly, married sons might also be under the authority of such a person, as might the "retired" mothers and fathers of either the husband or wife (or wives). This measure is an integer number of individuals.

In addition to defining the variable household size (HS), the definition of the household had a bearing on our wealth measure, because we measured wealth at the household level. We calculated household wealth as a cash

equivalent of all revenue-generating assets (other than human capital) owned by the household. Because of their complexity, these data were often collected from heads of households in separate surveys not administered on the day of the economic experiment. In some of our societies, such as the Hadza, very little property is privately owned and there are no cash-generating capital goods. In most of our societies, the bulk of household wealth is held in either land or livestock. However, some of our populations have a broad range of assets, from farm equipment to boats and rental property. We did not include the value of nonproductive assets—such as jewelry, radios, watches, houses, and household goods—in our computation of wealth.

In contrast to wealth, income data were collected for each individual who played a game, and it was each individual's income that we used in the regression analyses. Income was defined as the flow of revenue available to the individual from legal, illegal, formal, and informal sources. Each researcher attempted to get an estimate of annual income, taking into account the likely seasonal fluctuations.

Wealth and income are challenging variables to collect under the best of circumstances. We used the techniques of disaggregation by local categories and relevant time periods to be as inclusive as possible and to facilitate recall. We created local surveys that disaggregated all known sources of income and wealth and requested amounts in easily known time periods from local informants. Researchers then aggregated income sources on a weekly, monthly, or one-off basis into an annual figure. To verify accuracy we used a variety of standard ethnographic techniques, such as cross-checking informant reports by asking multiple informants the same questions (for example, independently asking fathers, mothers, sons, or daughters about the family's wealth). The fact that most of our researchers were longtime intermittent residents of these communities greatly facilitated the collection of accurate wealth and income data. Most of the income derived from wage work (casual and professional), trading profits, sale of home production, rental income, and remittances.

Community Population

For most of our societies, “community population” represents the size of the village in which the subjects playing the games reside. For the Hadza, these

are not villages, but nomadic camps. For the Isanga, the relevant social community is a portion of the larger settlement area in which they reside. In the case of the workers in Accra, we concluded that neither the size of the small firms in which they worked (seventeen employees in the case of the smallest) nor the population of Accra (2 million) was analogous to village size in our other samples. Consequently, Accra was dropped from the regressions that tested the effects of community size.

World Religion

Those who professed belief in Islam, unspecified Christianity, Protestantism, evangelical Protestantism, Russian Orthodoxy, or Catholicism were coded as believers in a world religion. No other world religions appeared in our sample. Those who practiced an indigenous religion (all of the Hadza, many of the Samburu, most of the Nganasan, and a smattering from other groups) and those who professed no religion were coded as not being members of a world religion. One should bear in mind, however, that among most of our populations conversion to Christianity and Islam often involved a complex merging of supernatural beliefs and ritual practices that represents a syncretic blend of indigenous beliefs with those of world religions.

Market Integration

Pursuing the market integration hypothesis was one of our central goals in phase 2. In phase 1, we had to rely on a crude ranking based on the ethnographers' subjective estimates of market integration, and we found a remarkably strong statistical relationship between this ranking and UG offers. In phase 2, we aimed to substantially improve on the rigor of our market integration measure. The team agreed that the percentage of the diet purchased in the market (MI1) was probably the best measure of the degree of market integration, as it provided a clear measure of how much the group depended on market exchange for its basic subsistence. It is common for food expenditures in developing nations to make up 60 to 80 percent of a household's monthly expenditures, so measuring food expenditures is central to understanding market reliance. Salt, sugar, cooking oil, rice, and flour are often the first items purchased when cash becomes part of a local economy (Henrich 1997).

As a robustness check, and with a view to creating a composite variable, we also collected four other measures of market integration (MI2–5). However, it soon became apparent during the analysis that either they were redundant (MI2) or they varied insufficiently across our samples to be of use (M3–5). We discuss the pros and cons of these measures here for the benefit of other researchers.

MI1: The Percentage of the Diet Purchased in the Market To create this measure we carried out a consumption survey at all sites. Our locally constructed consumption surveys disaggregated all typical food consumption for the area and recorded quantities consumed by source (purchased versus home production) for the entire eating unit. Our format was a twenty-four-hour recall of all food consumed in the household, with follow-up questions confirming whether the day was typical, and if not, what a typical day looked like. If there were seasonal variations, multiple surveys were taken to create an average. These quantities were then converted into caloric equivalents, and the ratio of purchased versus homegrown caloric consumption yielded the percentage of market dependence.

We left it to the discretion of the researchers whether they carried out the consumption survey individually with each person playing the game or carried out approximately twenty random surveys of each community where games were played and created an average market integration measure for participants from that community. The use of a community average rather than an individual measure of MI1 is justified on both operational and theoretical grounds. Operationally, households should ideally be surveyed over time, as many sites experience cyclical or erratic short-term fluctuations in market access and dependence. This means that an individual household-level measure of MI1 at one point in time is affected by this kind of noise. Since the sample of households within a community better spanned these temporal fluctuations than did individual samples taken on the day of game play, a community average gives a more accurate picture of people's average level of dependence on the market. Theoretically, we were aiming for a measure related to norms, which is a group-level phenomenon.

This measure of market integration is a proxy for the institutional or normative environment within which people reside. It is intended to capture the degree of average dependence on the market, but we also expect that this measure captures many other institutional qualities, such as the strength of

the rule of law that supports that level of market integration, which we did not directly measure. We expect that the norms we are seeking to identify are shared broadly in the community, and we have no prediction concerning how these will vary within communities. It is conceivable, however, that whole villages within an ethnic group vary significantly in their market dependence, as, for instance, might be the case if one village is near a road and a market center and another is remote from both. For example, among the cattle-herding Orma, Ensminger (2004) found significant differences in dictator game offers between villages based on level of market integration (those living a more nomadic subsistence lifestyle versus those living a more commercial, sedentary life). If researchers drew experimental subjects from different villages, those villages were surveyed separately for market integration and that variation was captured. In this volume, we use community averages of this variable in all the analyses because we deemed it to be theoretically the most appropriate.

MI2: The Game Player's Individual Income from Wage Labor, Rental Properties, and Trading Activities This measure included everything captured in our income variable, with the exception of income from home production, which we wished to isolate as a separate measure of involvement in the market. We originally identified wage labor and trading as important components of market integration that involve different market skills and perhaps broader degrees of integration into market networks. As it turned out, MI2 was correlated 0.99 with income, which we did use as a control variable, making MI2 redundant. MI1 and MI2 are themselves correlated at 0.28.

MI3: Frequency of Wage Labor in the Last Month Each game player was asked how frequently he or she had participated in wage labor in the last month. Most participants reported no wage labor in the previous month, so we had insufficient variation to test the impact of this measure. Additionally, it is clear that distortions would be created in fully market-oriented societies, such as our Missouri sample, when we consider how it would have treated unemployed wage workers, retirees, and nonworking spouses. MI1 and MI3 are correlated at 0.41.

MI4: Trips to Market in the Last Seven Days This measure was proposed because it seemed plausibly associated with the level of market integration (Gurven 2004; Weber 1958), and we speculated that those who frequented marketplaces might be more attuned to the market. However, while this measure seemed to capture what we were going for in some sites, it did not work well to capture much of the phenomena of interest in many other sites. Whether people shop once a week or twice daily may be a function of cash flow, the division of labor in the household, or merely individual preference, as we suspect it is in developed societies. Those engaged in wage work, arguably the most market-integrated in our societies, may not be the individuals who do the shopping. MI4 is correlated with MI1 at 0.31.

MI5: Frequency of Trading Goods for Purchase and Resale in the Prior Month This measure was designed to capture and isolate trader activity as distinct from the consumption of traded goods or the trading of one's own labor. The number of people in our sample involved in such activities was relatively small across our sites, and all the more so when we surveyed only the prior month. This yielded a heavily skewed distribution with a strong mode at 0 percent, which made this an ineffective variable. The correlation between MI1 and MI5 is −0.006.

The formal protocols and survey instruments that we used to operationalize all of these variables are available at Jean Ensminger's website: http://jee.caltech.edu/research/experimental-economics. These materials include the worksheets we used to calculate market integration, wealth, and income.

Calculating Minimum Acceptable Offers

For our measures of punishment, we collected a vector of rejection and punishment decisions from each player 2 in the UG and each player 3 in the TPG. For the purposes of analysis, we converted each of these vectors into a single number capturing the minimum acceptable offer (MinAO). An MinAO is the lowest offer—between 0 and 50 percent—that a person will accept, conditional on that person demonstrating consistent acceptance preferences for higher offers. For example, if a player states that he or she

will reject (UG) or punish (TPG) an offer of 0, but then accept 10 through 50, their MinAO is set at 10. If an individual accepts all offers (that is, does not reject in the UG or punish in TPG) up to and including 50 percent, his or her MinAO is set at 0. If the individual rejects or fines offers of 0 percent through 40 percent but accepts 50 percent, his or her MinAO is 50. For players with more than one switch from accept to reject (for example, reject 0, accept 10, reject 20…), we did not calculate an MinAO. We also ignored players who rejected all offers from 0 to 50. Four percent of player 2s in the UG (eighteen participants) and 10 percent of player 3s in the TPG (thirty-four participants) chose strategies inconsistent with this definition (for example, rejecting 0, accepting 10, rejecting 20…). Overall, we calculated the MinAO for 387 out of 405 player 2s in the UG and 305 out of 339 player 3s in the TPG. The majority of UG player 2s and TPG player 3s for whom MinAOs could not be calculated chose to reject or punish all offers up to and including 50 percent. These players were concentrated among the Hadza and Sursurunga for the UG and among the Maragoli for the TPG (for further details and discussions, see chapters 6, 11, and 12, available at: http://www.russellsage.org/publications/experimenting-social-norms).

Table 3.3 summarizes the mean demographics of our sample by society.

GAME PROCEDURES AND PROTOCOLS

Announcing the Games

Circumstances differed from site to site, but most researchers held a public meeting to announce the beginning of the games. We were careful in these meetings not to describe the games, but merely to inform people that they would be randomly invited to participate. Players were told nothing about the experiments before coming except that (1) their participation was completely optional, (2) they would have an opportunity to obtain some money, and (3) the whole process would take several hours.

Informed Consent

We knew in advance that many of the participants would be illiterate and would not be able to read descriptions of the research or sign consent forms. So in place of these procedures, at the start of each session the participants

were told that if at any point they became uncomfortable with any aspect of the games they were being asked to play, they would be free to leave, and that if they did so, they could retain their show-up fee (discussed later).

No-Shows and Unbalanced Numbers of Players

We had very few no-shows, as the populations in all of our sites were eager to play the games, both out of intellectual curiosity and to earn money. However, sessions often involved numbers of participants that were not multiples of the number of players in the games because of the occasional no-show or because of the few players who had to be disqualified because they did not pass the pregame tests. When this imbalance occurred, a participant was randomly picked and his or her decisions were used in the payoff calculations of more than one of the participants in the oversubscribed roles. The researchers chose this approach because all were of the opinion that turning away invited players, who might have walked many miles to participate, was unfair. It did mean that a tiny fraction of our subjects effectively played twice. (Their offers had two recipients.)

Collusion

We knew from our collective experiences that collusion within closely knit communities was a potential risk in these kinds of experiments. In experiments independent of this project that were run between phases 1 and 2, two members of our research team observed collusion among some participants in large villages when they ran several identical experiments over successive days in the same village. However, they never observed collusion between villages. The good news is that when villagers began to collude, behavior in the games converged to fair play so dramatically and universally that it was immediately apparent to the experimenters that the games had been corrupted. Further, instead of appearing confused, unsure, tentative, or struggling to understand the game during the training, players announced immediately how they wished to play, and there was nearly complete compliance with the collusion, so the usual variation in offers vanished. In these cases (not part of phases 1 or 2 of this project), some young village activists had organized the population and told everyone to play fifty-fifty in the ultimatum game. There was nothing subtle about it; the

demeanor of the players changed in a manner that was instantly transparent to the experimenters. The fact that virtually everyone complied with the collusion is interesting in itself. In these cases the games were terminated, the data were thrown out, and all experiments ceased in the affected villages. We suspect that not all small-scale societies are equally susceptible to this sort of community collusion, but we deemed it a serious concern and took the lessons of those experiences to heart when we set up the phase 2 protocols.

TABLE 3.3 *Mean Demographics, by Society*

Society	Market Integration	World Religion	Female	Age (Years)	Education (Years)	Household Size	Income (U.S. Dollars)	Wealth (U.S. Dollars)	Community Population
Accra	100%	96%	31%	36	10.5	2.7	$720	n.a.[b]	n.a.[a]
Standard deviation				(11.3)	(4.0)	(1.9)	(741)		
N	177	176	176	176	176	176	176		
Au	1%	100%	17%	38	3.3	5.5	$41	$89	309
Standard deviation				(11.7)	(3.2)	(2.1)	(143)	(52.6)	(46)
N	145	145	145	78	145	135	120	120	145
Dolgan/Nganasan	63%	60%	53%	38	9.7	4.7	$1,262	n.a.[b]	612
Standard deviation				(12.1)	(2.2)	(2.1)	(1,288)		(0.0)
N	59	40	59	59	57	59	59		59
Gusii	28%	100%	47%	45	11.9	n.a.[b]	$1,520	$6,008	4,063
Standard deviation				(9.7)	(2.5)		(676)	(1,358)	(727)
N	140	140	140	140	140		140	140	140
Hadza	0%	0%	43%	37	1.2	3.4	$0	$0	43
Standard deviation				(15.0)	(2.0)	(2.0)	(0.0)	(0.0)	(25)
N	116	116	116	116	116	114	116	116	116
Isanga	70%	99%	53%	37	7.6	5.9	$204	$153	1,500
Standard deviation				(12.1)	(2.3)	(2.1)	(310)	(174)	(0.0)
N	100	100	100	100	100	100	100	100	100
Maragoli	43%	100%	46%	46	12.5	7.2	$1,193	$1,951	3,843
Standard deviation				(8.4)	(1.2)	(1.7)	(494)	(373)	(1,148)
N	140	140	140	140	140	140	140	140	140
Orma	72%	100%	68%	39	0.0	8.7	$106	$1,447	125
Standard deviation				(13.0)	(0.0)	(3.7)	(168)	(1,781)	(32)
N	38	38	38	37	38	37	38	38	38
Samburu	69%	66%	56%	38	1.4	8.7	$359	$2,463	2,000
Standard deviation				(14.6)	(2.8)	(4.8)	(386)	(3,113)	(0.0)
N	123	117	117	117	117	120	117	121	123
Sanquianga	82%	84%	60%	38	4.0	6.8	$1,853	$2,400	1,931
Standard deviation				(15.4)	(3.0)	(2.9)	(2,419)	(4,728)	(400)
N	156	155	156	155	156	156	156	156	156

TABLE 3.3 *Continued*

Society	Market Integration	World Religion	Female	Age (Years)	Education (Years)	Household Size	Income (U.S. Dollars)	Wealth (U.S. Dollars)	Community Population
Shuar	22%	76%	41%	39	6.2	6.1	$737	$5,962	498
Standard deviation				(16.1)	(3.7)	(2.2)	(956)	(5,877)	(1,410)
N	49	49	49	47	47	49	49	49	49
Sursurunga	24%	100%	51%	36	6.7	5.5	$278	$5,024	186
Standard deviation				(13.4)	(2.9)	(2.3)	(479)	(5,679)	(23.4)
N	124	124	124	124	124	124	124	124	124
Tsimane'	7%	100%	53%	35	3.6	7.7	$128	$454	314
Standard deviation				(15.4)	(3.6)	(4.0)	(207)	(291)	(131)
N	146	146	146	146	135	145	71	65	146
U.S./rural Missouri	100%	100%	59%	47	13.7	2.9	$24,085	$115,757	1,813
Standard deviation				(17.5)	(2.1)	(1.2)	(18,792)	(180,875)	(0.0)
N	82	82	82	82	82	81	82	82	82
Yasawa	21%	100%	51%	38	8.4	6.9	$1,159	$424	109
Standard deviation				(15.3)	(2.3)	(3.2)	(1,112)	(510)	(22.4)
N	105	105	105	104	105	105	103	101	105
Total	46%	87%	47%	39	6.9	5.8	$1,958	$9,135	1,410
Standard deviation				(13.9)	(5.0)	(3.3)	(6,773)	(52,040)	(1,487)
N	1,733	1,678	1,693	1,621	1,678	1,541	1,591	1,352	1,523

Source: Authors' compilation based on author data.

[a]The mean community size for the Accra sample reflects the mean firm size where the games were played. Accra has a population of 2 million. We considered neither the firm size nor the city size to be equivalent to the community size in our other sites, so the Accra sample was dropped from the analyses of community size.

[b]Wealth data were not collected in Accra or for the Dolgan/Nganasan. Household size data were not collected among the Gusii.

To minimize the risk of collusion, the ideal solution is to play each game on only one day in each community and to keep all participants either isolated or unable to communicate about the game for the duration of the actual play. But given the sample sizes we required in phase 2 and the length of play, it was not possible to complete all games in one day. We weighed the risks of collusion against the problems of using more than one community to complete the sample. Sometimes community effects can be high, so we agreed to try to use one community for all of the DG and UG games. To minimize the likelihood of collusion we did not inform players on the first day that there would be more games, and we endeavored to provide the shortest possible notice to those who were randomly selected to play on subsequent days; these individuals were notified of their invitation either the evening before the game or the morning of the game. We detected no signs that collusion was a problem. Furthermore, checks on order of play in the overall data set revealed no signs of order or day effects (though see chapter 9 for a day effect not linked to collusion, available at: http://www.russellsage.org/Ensminger).

Session Protocol

All invited participants were told where and when to show up for a session. Where possible, we used community structures like schools; otherwise, we used clusters of local homes. Local research assistants were employed to control the logistical flow once the games began, to monitor the groups to prevent discussion of the games, and to conduct the requisite surveys. Those players who had completed playing the game or games were allowed to depart if they were finished and had been paid. Those who had undertaken only part of their roles in the games, but not all, were assigned to a separate waiting area so that they could not interact with those waiting to begin play. Participants were allowed to talk among themselves, but they were monitored and not permitted to talk about the games.

Back-Translation of Scripts

Each researcher had to have the game scripts translated into the appropriate local language. Researchers used the method of back-translation to obtain the best possible game translation. This involved having one bilingual assistant with no knowledge of the game translate the game instructions into the local language, and then having a second assistant translate it back, thus identifying any problems in the translation. This process is iterated until all translation problems are resolved. See the end of this chapter for the English version of the scripts.

PHOTO 3.2 *The Third-Party Punishment Game*

Source: Photo by Robert Boyd.
Note: Joe Henrich administers the third-party punishment game in the Village of Teci on Yasawa Island, Fiji.

GAME ADMINISTRATOR

All game instructions were read out by native speakers unless the project researcher was fluent in the local language (see photo 3.2). If a local interpreter was used, he or she was asked to turn around when offers were made so that no local individuals had knowledge of the players' offers. This helped guarantee the participants' anonymity, as promised by the researchers.

The Show-up Fee

Before the games began, the participants were all given a "show-up" fee, paid in cash at a rate of approximately 20 to 25 percent of one day's wage in the local economy. In some sites, because of the vagaries of currency denominations, these percentages diverged slightly. It was made clear to the participants that this money was strictly for their *participation* in the games and was not part of a game. Participants who failed to pass the required tests of game understanding were allowed to keep the show-up fee—which made it somewhat easier to reject them if the need arose.

Stakes

The game stakes were set at roughly one day's wage in the local community—that is, the rate ordinarily paid for casual wage labor work if it was available. For rural Missouri, this amounted to $50 to be divided between player 1 and player 2 in each game, while in many of the developing societies the stakes were in the range of $2. Because stakes had to be divisible by ten, some sites wound up with stakes that were marginally higher or lower than the daily wage rate. In many of our societies, casual wage work was hard to come by, so if anything, our stakes were effectively more valuable than one day's casual wage. We know of no societies in our sample where people did not desire cash for something, be it tobacco, beads, salt, cooking oil, knives, sugar, cloth, cattle, or shotgun shells.

Teaching Examples

In both teaching and testing the participants, researchers used actual coins and paper currency to illustrate the game (see photos 3.2 and 3.3). This visual presentation of the arithmetic of the games made it possible for people with limited or no arithmetic skill to still understand the game. If necessary, players could manipulate piles and count coins or bills during decision-making and testing. Specific teaching examples were scripted in the written protocols. Analyses show that the number of examples a player required did not predict decisions (see chapter 4).

Why Play the Dictator Game and Ultimatum Game in One Session?

In most of the societies, two types of session were run. First, the DG was conducted, followed by the UG. Ideally, the two games would have been conducted during separate sessions involving different randomly drawn subject samples (although the fact that they were not is exploited in the analysis relating to some predictions). However, we knew that in several of the smaller societies we would not have had enough subjects for all these sessions. Choosing to combine two of the games in a single-session design was preferred to allowing the researchers to reuse subjects repeatedly in active roles. We considered varying the order in which the DG and UG were played across sessions. However, doing so could have reduced comparability across societies. By fixing the order of the games, we maximized comparability. We also took into account that we already had UG results from many small-scale societies (phase 1), which provided us with a means to check whether the ordering influenced the results (more on this later). Finally, since the DG is much easier to understand compared to the UG (see chapter 9, available at: http://www.russellsage.org/Ensminger), the DG-then-UG ordering was of pedagogic value, a consideration that needs to be given considerable weight when working with unschooled subjects.

Game Logistics for the Core Games

Once all players had arrived, the game area was secured by the experimental team from the eyes and ears of nonparticipants, a show-up fee was paid (20 to 25 percent of the stake/one day's wage), and participants publicly and randomly selected an ID number from a container that determined their order of play and, unbeknownst to them until they were about to make their decisions, their role (player 1, player 2, or player 3) in the games. The public random draw was meant to convey clearly that order and role assignment were random.

PHOTO 3.3 *The Ultimatum Game Among the Tsimane'*

Source: Photo by Michael Gurven.
Note: Coins were taped together to make 10 percent increments of the total stake.

The game script was then read to the whole group (see photo 3.4). The script included the following points: (1) participation was purely optional and people were to feel free to leave at any time; (2) people's decisions were entirely private, except to the lead experimenter, who would not tell anyone (because most of our researchers were long-term fieldworkers in these locales, players' trust in them was high); (3) all games would be played only once; (4) players were not to discuss the game for the duration of play

(research assistants monitored the group for compliance); and (5) all the money was real, and people would receive payment to take home at the end of the session. The description of the experimental situation was followed by a fixed set of examples, which were illustrated to the group by visually moving bills or coins in the local currency.

After the instructions were read to the group, individual players were brought one by one into a separate area, where the game instructions were reread and more examples were given. Again, examples were illustrated by moving cash on a table or cloth with a line separating player 1's and player 2's allocations. If the player confirmed that he or she understood the game, and the experimenter agreed, they were given test questions that required them to state the amount of money that each player would receive under various hypothetical circumstances. Players had to correctly answer two consecutive test situations to pass and be allowed to participate in the experiment. (This actually required that four correct amounts be stated for the DG and UG, and six correct amounts for the TPG.) If a player could not do the required arithmetic, he or she was permitted to manipulate the money according to the hypothetical examples, and then count the money in each pile to answer; thus, everyone had to have the ability to count to ten. After passing this test, players were told their role in the actual game (whether they were player 1, player 2, or player 3) and were asked to make the required decision(s). If a research assistant was present, he or she had to turn away so as not to observe the actual decisions.

PHOTO 3.4 *Preparing for Game Instruction*

Source: Photo by Jeffrey Winking.
Note: Mike Gurven shown preparing the Tsimane' for game instruction.

As in most behavioral experiments, all participants knew everything about the experimental game except who was matched with whom. Our script specified that players were to be matched with another person or persons from the same community, but made clear that no one would know who was matched with whom. The script also made clear that the game would be played only once.

In our DG-UG sessions, players first played the dictator game and then played the ultimatum game. Player 1s in the DG kept their role in the UG. The inert player 2s in the DG, *before finding out what they received in the DG,* assumed the role of player 2 in the UG. Players in the TPG were by design, and most often, a fresh sample that had not participated in the prior

two games. The TPG was usually done weeks later, and in some societies, the TPG research was done in a different village from the DG and UG.

If one is concerned about the effects of placing a dictator game before an ultimatum game, consider five things. First, as previously noted, this procedure was carried out uniformly across sites, thereby enhancing our ability to make comparisons across sites. Second, as noted with regard to rejections in the UG, the second player in the UG was inert in the DG and had yet to learn his DG offer. Third, in the sites included in both phase 1 and phase 2 of the project, the UG data generated in phase 2 using this approach are comparable to the UG data generated in phase 1, in which the UG was the first and often the only game played. Third, the relationship between UG offers and market integration described in this volume replicates our prior finding using data from the UG without a preceding DG. Finally, in a control with university students in the United States, the UG findings are quite similar to typical UG findings in the literature that were conducted without a preceding DG (chapter 9, available at: http://www.russellsage.org/Ensminger).

Typical Game: Day 1

The goal for day 1 was one long session with the *same* twenty to thirty players playing both the dictator game and the strategy method ultimatum game. The DG always came first (often in the morning) and was followed by the UG (usually in the afternoon). Each player assumed the role of either player 1 or player 2 in both games. Two holding areas were set up: one for players who had not played the current game, and one for those who had finished but were either being held for the next game or waiting for payment.

For the DG, people were gathered together, paid the show-up fee, given the explanation of the game in a group, and brought individually into the gaming area. The random order of play was demonstrated overtly by picking names from a container. Players were told up front that they would be paid for this game after completing the next game.

After the DG offers were made, but before player 2s were informed of their offer, and before any players had been paid, the UG was run. Researchers often supplied food and drink to keep players comfortable. At the beginning of the UG, players were told that this was an entirely different game and that they would be playing with a different person. Again,

researchers overtly established a new random order of entry into the gaming area. After everyone finished playing both games, all players were brought in one by one for payment for both games.

Typical Game: Day 2 and Day 3

On days 2 and 3, researchers repeated the same procedure as on day 1. The minimum goal was thirty pairs total from each site, so our estimates suggested that the games would run for two or three days; we had a strong preference for the games lasting only two days (fifteen pairs per day), to avoid collusion.

We believed that our postgame questions had the potential to generate framing effects, so we agreed to administer them only after the last DG-UG session, and only if we were not planning to run the TPG game in that village. Postgame questions were sometimes administered after all the games were completed.

PHOTO 3.5 *The Third-Party Punishment Game Among the Au*

Source: Photo by Rachel D. Foreman.
Note: David Tracer shown administering the third-party punishment game among the Au of Papua New Guinea.

Third-Party Punishment

Typically, the third-party punishment game was performed either in different communities from the UG and DG or three or more weeks later with different participants from the same communities. Our goal was to have thirty trios for the TPG from each site. Researchers aimed to use mostly fresh players who had not played any of the prior games. For some researchers, this could be done only by using separate communities from within the same site for the TPG. For those running short of fresh players, it was acceptable to substitute repeat players for player 2 (who are passive in this game). Thus, the TPG required a minimum of sixty fresh adults in one village, plus thirty repeat players. In a few sites, some repeat players also

had to be used in the role of player 1 or player 3, owing to small population sizes.[5] Photo 3.5 shows the TPG being played among the Au in Papua New Guinea.

Exceptions and Problems

This section reviews the main divergences from the common protocol, but for more detail refer to each of the chapters for full details. The rural Missouri sample was a pilot test site for this project early in the process, and what we learned there informed our final protocols. Consequently, there were some important deviations there from the procedures and protocol used at all the other sites. First, the DG and the UG were run with different samples in Missouri, and in separate sessions rather than in one long session. Second, the UG in Missouri was run with the strategy method, but we did not elicit responses for offers above 50 percent. Finally, the decision to include the TPG also followed the Missouri games, so these data are also missing for Missouri. The Orma DG was also not run in a double session with the UG. It was run prior to, but in conjunction with, a double-blind DG (chapter 5). In two of the sites we use in the comparative analysis—Accra and Dolgan/Nganasan—we were unable to collect wealth data. For this reason, we ran our regression analyses first with wealth included, and then, if wealth was not an important predictor, we dropped wealth to bring in these two sites and demonstrate that the effects held either way.

After publishing a journal article on these data (Henrich et al. 2010), Gwako discovered that the household size data for the Gusii were corrupted, so this variable is missing for the Gusii. We have now rerun our analyses by both dropping the Gusii and dropping the household size variable. Overall, this strengthens our major findings, though it does mean that the analyses presented in chapter 4 differ slightly from those found in earlier publications. None of the substantive conclusions have changed.

Among the Tsimane', several methodological anomalies are potential causes for concern (chapter 8, available at: http://www.russellsage.org/Ensminger). In one case, players received game instructions late in the day and had to be sent home; they returned the next day to actually play. In the second case, a game was administered on a Sunday directly after a church service. As a check, we have rerun all of our baseline regressions for UG, DG, and TPG offers, as well as for all offers

together, and the UG and TPG minimum acceptable offers, excluding the Tsimane' (see chapter 4). These checks reveal no qualitative divergences from our baseline findings, with two exceptions. First, the *p*-value for the coefficient on market integration in the baseline regression for UG offers weakens to 0.13 when the Tsimane' are dropped. Second, the *p*-value for the coefficient on world religion in our baseline DG offer regression improves from 0.079 to 0.02.

Although we felt it was important to perform these checks, we emphasize that independent of these analyses, there are several reasons to believe that these procedural anomalies had little impact on the Tsimane' data. First, both the DG and UG findings are consistent with prior work using these experiments among some Tsimane' villages, though with different protocols (Gurven 2004; Gurven and Winking 2008; Gurven, Zanolini, and Schniter 2008, see also chapter 8, available at: http://www.russellsage.org/Ensminger). Second, prior work by different researchers among a very similar Amazonian population yielded quite similar UG findings (Henrich 2000; Henrich and Smith 2004). Third, we would expect these methodological anomalies to drive offers up, rather than down, and yet the Tsimane' tend to make extremely low offers in all three games. Preplay communication, which might have occurred when players went home for the night, typically drives offers up, based on much previous work with typical subjects (Ostrom, Gardner, and Walker 1994) as well as on the experiences of two of our own researchers in work prior to this project (as discussed earlier in the collusion section). Similarly, given our findings and work in psychology (Shariff and Norenzayan 2007), we would assume that attendance at a Catholic church service prior to playing ought to increase offers, if anything. In short, there is little reason to suspect that these anomalies affected play; if they did, there is reason to suspect that those effects worked against our market integration hypotheses.

Among the Au, we have a distorted sex ratio in the sample. Although the researcher (David Tracer) tried to get female participation, Au society is quite male-dominated, and the men insisted that they play rather than the females (see chapter 7, available at: http://www.russellsage.org/Ensminger).

In all but one of our sites (Hadza), the game scripts were read to the group before people were brought to play privately and instructed again in accordance with the script. Among the Hadza, instructions were given only in the privacy of a Land Rover, where the games were administered to avoid

eavesdropping (chapter 6, available at: http://www.russellsage.org/Ensminger).

The Order of Supplemental Games

By design, those running supplemental games finished all core games (DG, UG, TPG) before playing any of the supplemental games. If there was village talk about the games, we wanted to be sure that the core games were as uncorrupted as possible. Our supplemental games included double-blind DGs (chapter 5), contextualized games that “dressed up” the game with locally relevant details (chapter 11, available at: http://www.russellsage.org/Ensminger; Lesorogol 2007), and a trust game combined with a social network analysis (Barr, Ensminger, and Johnson 2010).

PRINCIPLES AND LESSONS FOR COLLABORATIVE PROJECTS

Collaborative projects of this kind are extremely difficult to execute, especially for researchers from disciplines, like cultural anthropology, that have few precedents in recent decades and no norms for collaboration in joint projects. Interestingly, large collaborations were far more common among earlier generations of anthropological researchers. In the twentieth century, a tradition of collaboration grew out of Harvard University, which spawned the Ramah Project (1936 to 1945), the Comparative Study of Values in Five Cultures (1949 to 1955) and the Chiapas Project (beginning in 1955). But these projects were structured more as coalitions of scholars working on a similar topic or in a similar geographic region than as teams attempting to implement a controlled protocol across sites. Perhaps the best anthropological example of an effort to implement a controlled protocol cross-culturally is yet another Harvard effort, the Six Cultures Project (Whiting 1963). Another example from the early 1960s was a collaboration of psychologists and anthropologists in which the strength of five visual illusions was tested in fifteen diverse societies (Segall, Campbell, and Herskovits 1966). Such large collaborative efforts in cultural anthropology died out in the subsequent decades.

Since we believe collaborative projects are crucial for advancing our understanding of human behavior, and because our project has recently inspired others to pursue similar efforts, we thought it would be useful to offer some thoughts on running such projects, as well as some of the principles that guided our work. We proffer these suggestions with humility because we still stand far from our ideal vision of a team approach to cross-cultural, transdisciplinary research that integrates diverse methods, including both experimental and ethnographic techniques. We hope future efforts of this sort might learn from both our insights and our mistakes.

The Power of Ethnography

In developing the two phases of our project, it was important to us that our research integrated ethnographic and experimental approaches. The approach we did not want to take—or to encourage—was the quick and dirty deployment of prepackaged experiments in strange and exotic places without the ethnographic experience to guarantee that they would be understood and administered correctly and that the results would be interpreted within the context of the local economic situation, cultural beliefs, and history. With this priority, we recruited ethnographers and economists who were seasoned fieldworkers, some of whom brought as much as thirty years of familiarity with the population with whom they would run the economic experiments. At our conferences, each fieldworker presented his or her own analyses of the data informed by his or her extensive knowledge of the local cultural context. Each researcher then produced a chapter for each phase of the project. Ethnography and experiments are complementary sets of tools for understanding human behavior and psychology. A lot less commitment is required, however, to run a battery of experiments than to do great long-term qualitative and quantitative ethnography, so we worry about a tendency to drop the latter in favor of the former.

Balancing Team Diversity and Unity of Scientific Purpose

Our team is intellectually diverse. Over the two phases of the project, our teams included both cultural and biological anthropologists, as well as development economists, formal economic theorists, and experimental economists. Two of our anthropologists also had positions at various points

in psychology departments. Our team of fieldworkers was made up mostly of anthropologists but also included Abigail Barr and Juan-Camilo Cardenas, both economists with extensive field experience. In terms of theoretical perspectives, the teams included economic anthropologists, game theorists, behavioral economists, human behavioral ecologists, evolutionary psychologists, and dual inheritance researchers. Though our teams were dominated by Americans, they also included a Mexican, Colombian, Canadian, Brit, and Kenyan. We also had researchers of quite different levels of experience, ranging from emeritus professors to senior graduate students. This age variation allowed the project to develop its own talent as our graduate students in phase 1 became full professors by the end of phase 2.

As important as diversity is, unity of scientific purpose is perhaps more important. Despite the intellectual diversity of our research team, everyone agreed that the systematic collection of quantitative data is central to understanding human behavior and that experiments are an important part of that endeavor. And since everyone also shared a roughly economic-evolutionary framework for thinking about explanations, we may not always have agreed on what the important hypotheses were, or how to frame them, but we did generally agree on what a sensible question was, on the kind of research strategy necessary to address it, and on the need for rigorous scientific method to evaluate knowledge claims. This commitment to scientific method was the overriding glue that held us together through all the push and pull associated with our otherwise diverse scholarly traditions.

Building a Team

For a project like this, it is important to select researchers who are capable of being team players. Cultural anthropologists are generally acculturated to a “lone ranger” model of both research and scholarship, and they are trained and incentivized to pioneer new territories and to tear down others' work (via critique) as much as to build on the foundations of others and cooperate in teams. Working within the confines of an explicitly scripted protocol may not come as naturally to cultural anthropologists as it does to seasoned laboratory scientists or, indeed, to laboratory-based experimental economists. Add to that the inevitable challenges of unforeseen circumstances in wildly varying field sites and the potential for “maverick”

on-the-fly innovations can torpedo the best-laid plans for scientific controls. Thus, collaborators should be selected with extreme care.

Attrition

Project organizers should expect and plan on attrition on the order of 30 percent of the researchers who originally sign on. We lost researchers in both phases for a variety of reasons. Some people dropped out for personal reasons or because of competing professional responsibilities, others could not access the populations they had planned to work with, and still others were unable to deliver on commitments or to comply with agreements and had to be asked to leave. Project organizers need to be tough enough to make these decisions for the integrity of the project and the benefit of the group as a whole.

A Flexible Proposal with a Strong Backbone

Our experience suggests that it is important to have a strong plan for research to guide the operationalization of key variables, but also to leave room for the team members to have input and to help develop the methods, protocols, and scripts so that mid-experimental corrections and solo innovations to get around field-specific obstacles are minimized. At the beginning, however, one can be too flexible. It may sound appealingly democratic to create an open-ended project that the team jointly develops, but we are skeptical about how well this works in practice. Committees that reach the size of this team (fifteen, plus advisers) become incapable of reaching closure on key decisions. But swinging too far toward top-down, ex ante design does not allow the team members to improve the project, or adapt it to accommodate all field circumstances.

A Plan for Authorship, Authorship Order, and the Use of the Data

We recommend a formal discussion early on that spells out sensitive issues such as rules for co-authorship and control of the data prior to its migration into the public domain. Since fields like anthropology and psychology do not

have solid norms for running collaborative projects and lack the hierarchies that often dictate these issues in scientific laboratories, it is easy for researchers to operate with contradictory rules of thumb. These agreements should be written down and agreed to early in the process, even though they will not become relevant until after data collection is complete, which may be years in the future.

Financial Incentives

Getting individual researchers to deliver their data sets, supporting documentation, and drafts for joint publications on schedule is one of the more difficult parts of this kind of endeavor. We used financial incentives, and they worked extremely well. Those who did not manage to meet the deadlines associated with the first financial payouts were the most likely to drop out of the project, and it was better for the project that these departures occurred early.

Organization and Documentation Is Critical

A massive amount of clerical, logistical, and administrative work backstops a project of this sort. The ideal solution is to have a postdoctoral scholar or administrative aide assigned to the project full-time. However, this will not carry the project through the long period of publication once the original grants have expired, and that is a time when the need for database management, web support, and logistical support is as great as ever. These demands should not be underestimated, as they have the potential to overwhelm the organizers and slow the process of bringing the project to publication.

A Different Organizational Structure

Though we have not used it in either phase of this project, we have some thoughts about a different organizational structure for a project of this sort. We would not wish to dispense with the valuable contributions that only seasoned ethnographers can bring to experimental design, implementation, and critical contextual analysis, but it would be worth trying this model with

the addition of a single experiment administrator who travels around to all of the research sites and jointly administers the actual experiment in each site with the ethnographers. This might be a postdoctoral scholar, for example, with extensive experience running field experiments. This design would have the advantage of controlling for the experimenter and helping to minimize slight differences in experimental implementation that might otherwise not even be known to the rest of the team.[6] This model would add new challenges, particularly in schedule coordination, but we suspect that it offers potential for better scientific control.

In the next chapter, we move to our synthesis of the major empirical findings from phase 2 of the Roots of Human Sociality Project.

APPENDIX A: SESSION INSTRUCTIONS AND SCRIPTS

Introductory Comments and Instructions for All Sessions

[At the start of every session, the participants are instructed not to ask questions during the group training and informed that they will have a chance to ask questions once they are alone with the game administrator. These introductory comments and instructions are given at the start of each session. Please note that this appendix has not been edited and appears exactly as it appeared during all sessions.]

Thank-you all for taking the time to come today. Today's games may take 2 to 3 hours [*adjust where necessary*], so if you think you will not be able to stay that long let us know now. Before we begin I want to make some general comments about what we are doing here today and explain the rules that we must follow. We will be playing some games with money. Whatever money you win in the games will be yours to keep and take home. *[researcher's name]* will be supplying the money. But you should understand that this is not *[researcher's name]* own money. It is money given to her by the *[researcher's university]* to use for research. This research will eventually be part of a book; [*optional:* it is not part of a development project]. These games are part of a scientific research project involving many researchers like *[researcher's name]* and people from many different societies.

Before we proceed any further, let me stress something that is very important. Many of you were invited here without understanding very much

about what we are planning to do today. If at any time you find that this is something that you do not wish to participate in for any reason, you are free to leave regardless of whether we have started the game or not.

We will be playing two *[one, if it is a third party punishment session]* games. We are about to begin the (first) game. It is important that you listen as carefully as possible, because only people who understand the game will actually be able to play. *[If providing group explanation:]* We will run through some examples here while we are all together. You cannot ask questions or talk while here in the group. This is very important. Please be sure that you obey this rule, because it is possible for one person to spoil the game for everyone. If one person talks about the game while sitting in the group, we will not be able to play the game today. Do not worry if you do not completely understand the game as we go through the examples here in the group. Each of you will have a chance to ask questions in private to be sure that you understand how to play.

Before we begin the first game I am going to pass out $2 to each of you to thank-you for coming today. This money is not part of the game, it is yours to keep.

Script for the Dictator Game Group Training

This first game is played by pairs of individuals. Each pair is made up of a Player 1 and a Player 2. Each of you will play this game with someone from this community. However, none of you will know exactly with whom you are playing. Only *[researcher's name]* knows who plays with whom, and she/he will never tell anyone. *[researcher's name]* will provide $10 to each pair of players. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must allocate between $0 and the total $10 to Player 2. Player 2 takes home whatever Player 1 allocates to them, and Player 1 takes home whatever he or she does not allocate to Player 2.

We will now run through 5 examples to show you how the game might be played:

1. Here is the $10. Imagine that Player 1 chooses to allocate $9 to Player 2. Then, Player 2 will go home with $9 and Player 1 will go home with $1 ($10 minus $9 equals $1).

2. Here is another example. Imagine that Player 1 chooses to allocate $2 to Player 2. Then, Player 2 will go home with $2 and Player 1 will go home with $8 ($10 minus $2 equals $8).
3. Here is another example. Imagine that Player 1 chooses to allocate $5 to Player 2. Then, Player 2 will go home with $5 and Player 1 will go home with $5 ($10 minus $5 equals $5).
4. Here is another example. Imagine that Player 1 chooses to allocate $7 to Player 2. Then, Player 2 will go home with $7 and Player 1 will go home with $3 ($10 minus $7 equals $3).
5. Here is another example. Imagine that Player 1 chooses to allocate zero to Player 2. Then, Player 2 will go home with zero and Player 1 will go home with $10 ($10 minus zero equals $10).

We will now call each of you in turn to play the game. You will meet with *[researcher's name]* and *[assistant's name]* in private. They will explain the game again and ask you to work through a couple of examples to be sure that you understand. Then they will tell you whether you are Player 1 or Player 2 and you will play the game for real. Please do not talk about the game while you are waiting.

Remember, if anyone talks about the game we will have to stop the game.

Script for One-on-One Meetings with Players in the Dictator Game

*[**Notes:** With individual players the researchers and assistants worked through the examples and test questions with real notes and coins on a flat surface with a line drawn on it demarking the areas assigned to Players 1 and 2. Each of the examples presented below was presented either as an example or used as a test question as required. If more test questions were needed the researcher or assistant began again with the first example above. The script below is written assuming that 6 more examples were given, 3 presented as test scenarios, i.e., the subjects were asked questions about the amounts the subjects would take home. The 11 examples/tests − 5 above, 6 below − cover the full set of possible choices for Player 1.]*

This game is played by pairs of individuals. Each pair is made up of a Player 1 and a Player 2. Each of you will play this game with someone from this community. However, none of you will know exactly with whom you are playing. Only *[researcher's name]* knows who plays with whom, and she/he will never tell anyone. *[Researcher's name]* will provide $10 to each pair of players. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must allocate between $0 and $10 to Player 2. Player 2 takes home whatever Player 1 allocates to them, and Player 1 takes home whatever he or she does not allocate to Player 2.

Here are some more examples:

1. Imagine that Player 1 chooses to allocate $10 to Player 2. Then, Player 2 will go home with $10 and Player 1 will go home with zero ($10 minus $10 equals zero).
2. Here is another example. Imagine that Player 1 chooses to allocate $4 to Player 2. Then, Player 2 will go home with $4 and Player 1 will go home with $6 ($10 minus $4 equals $6).
3. Here is another example. Imagine that Player 1 chooses to allocate $6 to Player 2. Then, Player 2 will go home with $6 and Player 1 will go home with $4 ($10 minus $6 equals $4).
4. Suppose that Player 1 chooses to allocate $1 to Player 2. In this case, how much will Player 1 go home with? [$9] And how much will Player 2 go home with? [$1]
5. Now try this one. Suppose that Player 1 chooses to allocate $8 to Player 2. In this case, how much will Player 1 go home with? [$2] And how much will Player 2 go home with? [$8].
6. Now try this one. Suppose that Player 1 chooses to allocate $3 to Player 2. In this case, how much will Player 1 go home with? [$7]. And how much will Player 2 go home with? [$3].

[*For Player 1s*] You are a Player 1. While I (or *[assistant's name]*) turn(s) away, please divide this money into two piles and push the amount that you wish to go to Player 2 over the line. Finally, point to the amount that you wish to allocate to Player 2. [*Wait until they have made their offer then say*…] You must now wait while the rest of the players, one of whom will be

your Player 2, finish playing the game. Then we will play another game. *[Researcher's name]* will pay you for both games [*point to the pile to demonstrate the amount*] after we finish the second game. Remember that you cannot talk about the game while you are waiting to play the second game. [*The player is then guided to the holding location separate from those who have not yet played*.]

[*For Player 2s*] You are a Player 2. Player 1 has allocated a sum of money to you. After we finish playing the second game I will pay you what Player 1 has allocated to you [*Do NOT at this time tell them what player 1 has offered them.*] For now I need you to wait until everyone has finished playing this game. Remember that you cannot talk about this game while you are waiting to play the second game. [*The player is then guided to the holding location separate from those who have not yet played*.]

Script for the Ultimatum Game Group Training

We are now ready to begin playing the second game. Let me remind you that you may not ask questions or talk while you are here in the group. You will have an opportunity to ask questions in private when you meet with *[researcher's name]* to play the game. This is *not* the same game that you just played, so be sure to listen to the instructions carefully.

This second game is played by pairs of individuals. Each pair is made up of a Player 1 and a Player 2. Each of you will play this game with someone from this community, but it will not be the same person you played with in the first game. As before, none of you will know exactly with whom you are playing. Only *[researcher's name]* knows who plays with whom and she/he will never tell anyone.

[Researcher's name] will provide $10 to each pair of Players. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must offer between $0 and $10 (the total) to Player 2. Player 1 then has to wait while his or her offer is presented to Player 2. *Before hearing* the offer made to them by Player 1, Player 2 has to state whether he or she would accept or reject each of the possible offers between $0 and $10 that Player 1 could have made. If Player 2 has stated that he or she would accept Player 1's offer, then Player 2 gets the amount of the offer and Player 1 gets

the remainder. If Player 2 has stated that he or she would reject Player 1's offer, then neither Player receives any money from this game.

We will now run through some examples to show you how the game might be played:

1. Here is the first example. Imagine that Player 1 offers $9 to Player 2. Now, before hearing about this, Player 2 has stated that he would reject an offer of $9 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 might have made, but we will not worry about that now.) Because Player 2 said he would reject $9, Player 1 goes home with nothing and Player 2 goes home with nothing.
2. Here is another example. Imagine that Player 1 offers $9 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $9 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 might have made, but we will not worry about that now.) In this case, Player 1 goes home with $1 ($10 minus $9 equals $1) and Player 2 goes home $9.
3. Here is another example. Imagine that Player 1 offers $2 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $2 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 might have made, but we will not worry about that now.) Because Player 2 said he would accept this offer, Player 1 goes home with $8 ($10 minus $2 equals $8), and Player 2 goes home with $2.
4. Here is another example. Imagine that Player 1 offers $2 to Player 2. But now, before hearing about this, Player 2 has stated that he would reject an offer of $2 from Player 1. (Player 2 also stated whether he would accept or reject each of the other possible offers that Player 1 could have made, but we will not worry about that now.) In this case, Player 1 goes home with nothing, and Player 2 also goes home with nothing.
5. Here is another example. Imagine that Player 1 offers $5 to Player 2. Now, before hearing about this, Player 2 has stated that he would reject an offer of $5 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now.) Because Player 2 said he

would reject an offer of $5 from Player, Player 1 goes home with nothing and Player 2 goes home with nothing.

6. Here is another example. Imagine that Player 1 offers $5 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $5 from Player 1. (Player 2 has also stated whether they would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now.) In this case, Player 1 goes home with $5 ($10 minus $5 is $5) and Player 2 goes home with $5.

7. Here is another example. Imagine that Player 1 offers $7 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $7 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now.) Because Player 2 said he would accept an offer of $7, Player 1 goes home with $3 ($10 minus $7 equals $3). And Player 2 goes home with $7.

8. Here is another example. Imagine that Player 1 offers $7 to Player 2. But now, before hearing about this, Player 2 has stated that he would reject an offer of $7 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 might have made, but we will not worry about that now.) In this case, Player 1 goes home with nothing, and Player 2 goes home with nothing.

9. Here is another example. Imagine that Player 1 offers $0 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $0 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now.) Because Player 2 said he would accept $0 from Player 1, Player 1 goes home with $10 ($10 minus zero is $10) and Player 2 goes home with nothing.

10. Here is another example. Imagine that Player 1 offers $0 to Player 2. But this time, before hearing about this offer, Player 2 has stated that he would reject an offer of $0 from Player 1. (Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now.) In this

case, Player 1 goes home with nothing and Player 2 goes home with nothing.

We will now call each of you in turn to play the game. You will again pick a number from this hat to determine the order in which you will play the game. You will again meet *[researcher's name]* (and *[assistant's name]*) in private. They/she/he will explain the game again and ask you to work through a couple of examples to be sure that you understand. You can ask them any questions about the game. Then they/she/he will tell you whether you are Player 1 or Player 2 and you will play the game for real.

Remember, if anyone talks about the game we will have to stop the game.

Script for One-on-One Meetings with Players in the Ultimatum Game

*[**Notes:** With individual players the researchers and assistants worked through the examples and test questions with real notes and coins on a flat surface with a line drawn on it demarking the areas assigned to Players 1 and 2. Each of the examples presented below was presented either as an example or used as a test question as required. If more test questions were needed the researcher or assistant began again with the first example above. The script below is written assuming that 6 more examples were given and 6 test questions asked. The 22 examples/test questions − 10 above, 12 below − cover the full set of possible choice combinations.]*

This second game is played by pairs of individuals. Each pair is made up of a Player 1 and a Player 2. Each of you will play this game with someone from this community, but it will not be the same person that you played with in the first game. As before, none of you will know exactly with whom you are playing. Only *[researcher's name]* knows who plays with whom and she/he will never tell anyone. *[Researcher's name]* will provide $10 to each pair of Players. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must offer between $0 and the $10 (the total) to Player 2. Player 1 then has to wait while their offer is presented to Player 2. *Before hearing* the offer made to them by Player 1, Player 2 has to state whether he or she would accept or reject each of the possible offers between $0 and $10 that Player 1 could have made. If Player 2 has stated that he or she would accept Player 1's offer, then Player 2 gets the amount of

the offer and Player 1 gets the remainder. If Player 2 has stated that he or she would reject Player 1's offer, then neither Player receives any money from this game. Here are some more examples:

1. Imagine that Player 1 offers $10 to Player 2. Now, before hearing about this, Player 2 has stated that he would reject an offer of $10 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then Player 1 goes home with nothing and Player 2 goes home with nothing.
2. Imagine now that Player 1 offers $10 to Player 2. But this time, before hearing about this, Player 2 has stated that he would accept an offer of $10 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then Player 1 goes home with nothing ($10 minus $10 equals zero (nothing)) and Player 2 goes home with $10.
3. Imagine that Player 1 offers $4 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $4 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then, Player 1 goes home with $6 ($10 minus $4 equals $6). And Player 2 goes home with $4.
4. Imagine again that Player 1 offers $4 to Player 2. Now, before hearing about this, Player 2 has stated that he would reject an offer of $4 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then, Player 1 goes home with nothing. And, Player 2 goes home with nothing.
5. Imagine that Player 1 offers $6 to Player 2. Now, before hearing about this, Player 2 has stated that he would reject an offer of $6 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then Player 1 goes home with nothing and Player 2 goes home with nothing.

6. Imagine that Player 1 offers $6 to Player 2. Now, before hearing about this, Player 2 has stated that he would accept an offer of $6 from Player 1. Player 2 has also stated whether he would accept or reject all the other possible offers that Player 1 could have made, but we will not worry about that now. Then Player 1 goes home with $4 ($10 minus $6 equals $4). And Player 2 goes home with $6.

Test question formats:

1. Suppose that Player 1 offers $1 to Player 2 and that, before hearing about this, Player 2 has stated that he would accept an offer of this amount. In this case, how much will Player 1 go home with? [$9] And how much will Player 2 go home with? [$1].
2. And what if, before hearing about this, Player 2 has stated that he would reject an offer of this amount. In this case, how much will Player 1 go home with? [nothing] And how much will Player 2 go home with? [nothing]
3. Now try this one. Suppose that Player 1 offers $8 to Player 2 and that, before hearing about this, Player 2 has stated that he would accept an offer of this amount. In this case, how much will Player 1 go home with? [$2] And how much will Player 2 go home with? [$8].
4. And what if, before hearing about this, Player 2 has stated that he would reject an offer of this amount. In this case, how much will Player 1 go home with? [nothing] And how much will Player 2 go home with? [nothing]
5. Now try this one. Suppose that Player 1 offers $3 to Player 2 and that, before hearing about this, Player 2 has stated that he would reject an offer of this amount. In this case, how much will Player 1 go home with? [$0] And how much will Player 2 go home with? [$0]
6. And what if, before hearing about this, Player 2 has stated that he would accept an offer of this amount. In this case, how much will Player 1 go home with? [$7] And how much will Player 2 go home with? [$3]

[*For Player 1s*] You are a Player 1. While I (or *[assistant's name]*) turn(s) away, please divide this money into two piles and push the amount that you

wish to offer over the line. Finally, point to the amount that you wish to offer to Player 2. [*Wait until they have made their offer then say*…] You must now wait while the rest of the players finish playing the game. *[Researcher's name]* will present the offer you have made to Player 2 and we will find out if it is accepted or rejected. Later we will call you back to let you know whether the offer was accepted and pay you what you are owed for each game. [*The player was then guided to the holding location separate from those who have not yet played*.]

[*For Player 2s*] You are a Player 2. The offer that Player 1 has made to you is written on the slip of paper in front of *[researcher's name]*. Before *[researcher's name]* turns the slip over and shows Player 1's offer to you, tell me which of the following offers you would accept and which you would reject. These decisions will determine what you actually receive once we see what Player 1 has offered you. Please note that you will not get a chance to change your mind after the slip has been turned over. [*Occasionally, when it seemed necessary, the players were given the following reminder*…] Remember that Player 1's offer is right there on that slip of paper [*slip in front of researcher pointed at*]. Nothing you decide now can change what is written there.

1. If Player 1 offered you $10 and kept $0 for him or herself would you accept or reject?
2. If Player 1 offered you $9 and kept $1 for him or herself would you accept or reject?
3. If Player 1 offered you $8 and kept $2 for him or herself would you accept or reject?
4. If Player 1 offered you $7 and kept $3 for him or herself would you accept or reject?
5. If Player 1 offered you $6 and kept $4 for him or herself would you accept or reject?
6. If Player 1 offered you $5 and kept $5 for him or herself would you accept or reject?
7. If Player 1 offered you $4 and kept $6 for him or herself would you accept or reject?

8. If Player 1 offered you $3 and kept $7 for him or herself would you accept or reject?
9. If Player 1 offered you $2 and kept $8 for him or herself would you accept or reject?
10. If Player 1 offered you $1 and kept $9 for him or herself would you accept or reject?
11. If Player 1 offered you $0 and kept $10 for him or herself would you accept or reject?

[*Researcher's name*] will now show you what Player 1 offered you. [*Slip of paper turned over to reveal offer*.] You stated that you would accept/reject an offer of this amount. So, your winnings from this game will be $……… You have now finished playing the second game. Please go to the waiting area and as soon as everyone has finished playing I will call you all back one by one to be paid for both games.

[Once everyone had played the ultimatum game, each player was called for one final one-on-one meeting during which they were paid what they were owed for both the dictator and the ultimatum games. The players were shown how much they earned in each of the games separately. The order in which they were called was randomized. Local assistants turned around when the payments were handed over.]

Script of the Third Party Punishment Game Group Training

There are three players in this game—Player 1, Player 2, and Player 3. All three players are from this community. None of you will know exactly with whom you are playing. Only *[researcher's name]* knows who is to play with whom and she/he will never tell anyone else. *[Researcher's name]* will provide $10 to Player 1 and Player 2 as a pair. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must allocate between $0 and the total $10 to Player 2 and keep the rest for himself/herself. Player 2 takes home whatever Player 1 allocates to him or her, but Player 1 has to wait until Player 3 has played before finding out how much money he or she gets to take home. Player 3 is given $5. ***Before*** hearing how much Player 1 has sent to Player 2, Player 3 has to consider each of the possible amounts that Player 1 could have allocated to Player 2

and, for each possible amount, has to decide whether he or she wants to: 1) Pay $1 out of their $5 to subtract $3 from the money Player 1 kept for him or herself (this would mean that Player 3 would go home with $4); or 2) Pay nothing, i.e., keep their full $5, and leave things unchanged. Here are some examples:

[As in the dictator and ultimatum games, the examples were worked through with real coins or notes.]

1. Suppose Player 1 allocates $7 to Player 2, and keeps $3 for him or herself. Now, before hearing what Player 1 has allocated, Player 3 states that he or she would pay $1 to subtract $3 from Player 1 if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or do nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with nothing ($10 minus the $7 (given to Player 2) minus $3 equals $0). Player 2 goes home with the $7 from Player 1. And, Player 3 goes home with $4 ($5 minus $1 equals $4).
2. Here is another example. Again suppose Player 1 allocates $7 to Player 2, but this time Player 3 states that he would "do nothing" if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $3 ($10 minus $7 equals $3). Player 2 goes home with the $7 from Player 1. And Player 3 goes home with $5.
3. Here is another example. Suppose Player 1 allocates $5 to Player 2. And before hearing this, Player 3 states that he would pay $1 to subtract $3 from Player 1 if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $2 ($10 minus the $5 (given to Player 2) minus $3 equals $2). Player 2 goes home with the $5 from Player 1. And, Player 3 goes home with $4 ($5 minus $1 equals $4).
4. Here is another example. As before, suppose Player 1 allocates $5 to Player 2, but this time Player 3 states that he would "do nothing" if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts,

but we won't worry about that now.) In this case, Player 1 goes home with $5 ($10 minus $5 equals $5). Player 2 goes home with the $5 from Player 1. And Player 3 goes home with $5.

5. Here is another example. Suppose Player 1 allocates $2 to Player 2. And Player 3 states that he would pay $1 to subtract $3 from Player 1 if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $5 ($10 minus the $2 (given to Player 2) minus $3 equals $5). Player 2 goes home with the $2 from Player 1. And, Player 3 goes home with $4 ($5 minus $1 equals $4).
6. Here is another example. Again, suppose Player 1 allocates $2 to Player 2, but this time Player 3 states that he would “do nothing” if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to have $3 taken away or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $8 ($10 minus $2 equals $8). Player 2 goes home with the $2 from Player 1. And Player 3 goes home with $5.

We will now call each of you in turn to play the game. We will explain the game again and ask you to work through a couple of examples to be sure that you understand. Then we will tell you whether you are Player 1, Player 2, or Player 3 and you will play the game for real.

Script for One-on-One Meetings with Players in the Third Party Punishment Game

*[**Notes:** With individual players the researchers and assistants worked through the examples and test questions with real notes and coins on a flat surface with lines drawn on it demarking the areas assigned to Players 1, 2 and 3. Each of the examples presented below was presented either as an example or used as a test question as required. If more test questions were needed the researcher or assistant began again with the first example above. If required further examples and test questions could be drawn from a pre-ordered list.]*

There are three players in this game—Player 1, Player 2, and Player 3. All three players are from this community. None of you will know exactly with whom you are playing. Only *[researcher's name]* knows who is to play with whom and she/he will never tell anyone else. *[Researcher's name]* will provide $10 to Player 1 and Player 2 as a pair. Player 1 must decide how to divide this money between him or herself and Player 2. Player 1 must allocate between $0 and the total $10 to Player 2 and keeps the rest for him or herself. Player 2 takes home whatever Player 1 allocates to them, but Player 1 has to wait until Player 3 has played before finding out how much money he or she gets to take home. Player 3 is given $5. ***Before*** hearing how much Player 1 has sent to Player 2, Player 3 has to consider each of the possible amounts that Player 1 could have allocated to Player 2 and, for each possible amount, has to decide whether he or she wants to: 1) Pay $1 of their $5 to subtract $3 from the money Player 1 kept for him or herself (this would mean that Player 3 would go home with $4; or 2) Pay nothing, i.e., keep their full $5 and leave things unchanged. Here is another example:

1. Here is an example. Suppose Player 1 allocates $1 to Player 2. Player 3 states that he would pay $1 to subtract $3 from Player 1 if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $6 ($10 minus the $1 (given to Player 2) minus $3 equals $6). Player 2 goes home with the $1 from Player 1. And, Player 3 goes home with $4 ($5 minus $1 equals $4).
2. Here is another example. As before, suppose Player 1 allocates $1 to Player 2, but Player 3 stated that he would "do nothing" if Player 1 does this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $9 ($10 minus $1 equals $9). Player 2 goes home with the $1 from Player 1. And Player 3 goes home with $5.
3. Here is another example. Suppose Player 1 allocates $6 to Player 2. Player 3 states that he would pay $1 to subtract $3 from Player 1 if Player 1 were to do this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $1 ($10

minus the $6 (given to Player 2) minus $3 equals $1). Player 2 goes home with the $6 from Player 1. And, Player 3 goes home with $4 ($5 minus $1 equals $4).

4. Here is another example. As before, suppose Player 1 allocates $6 to Player 2, but this time Player 3 states that he would “do nothing” if Player 1 does this. (Player 3 also states what he would do (pay $1 to subtract $3 or pay nothing) if Player 1 allocates other possible amounts, but we won't worry about that now.) In this case, Player 1 goes home with $4 ($10 minus $6 equals $4). Player 2 goes home with the $6 from Player 1. And Player 3 goes home with $5.

Now, can you answer these questions?

1. Imagine that Player 1 allocates $4 to Player 2 and that Player 3 states that he would pay nothing and leave things unchanged if Player 1 were to do this. How much does Player 1 go home with ($6)? How much does Player 2 go home with ($4)? How much does Player 3 go home with ($5)? How much are Players 1 and 2 given initially?
2. But what if Player 3 states that they would pay $1 to subtract $3 from Player 1 if Player 1 allocates $4 to Player 2. How much does Player 1 go home with ($3)? How much does Player 2 go home with ($4)? How much does Player 3 go home with ($4)?
3. Imagine that Player 1 allocates $0 to Player 2 and that Player 3 states that he would pay nothing and leave things unchanged if Player 1 does this. How much does Player 1 go home with ($10)? How much does Player 2 go home with ($0)? How much does Player 3 go home with ($5)?
4. But what if Player 3 states that they would pay $1 to subtract $3 from Player 1 if Player 1 allocates $0 to Player 2. How much does Player 1 go home with ($7)? How much does Player 2 go home with ($0)? How much does Player 3 go home with ($4)?

[*For Player 1s*] You are a Player 1. You are playing with a Player 2 and a Player 3 who are from this community. While I (or *[assistant's name]*) turn(s) away, please divide this money into two piles and push the amount that you wish to allocate to Player 2 over the line. Finally, point to the

amount that you wish to go to Player 2. [*Wait until they have made their offer then say…*] You must now wait while the rest of the Players finish playing the game. We will find out what your Player 3 does. When everyone has played, we will call you back, explain what happened and pay you your winnings. [*The player was then guided to the holding location separate from those who have not yet played.*]

[*For Player 2s*] You are a Player 2. You are playing with a Player 1 and a Player 3 who are from this community. Player 1 has allocated a sum of money to you. After everyone has finish playing the game I will pay you what Player 1 has allocated to you. For now I need you to wait until everyone has finished playing this game. [*The player was then guided to the holding location separate from those who have not yet played*.]

[*For Player 3s*] You are a Player 3. You are playing with a Player 1 and a Player 2 who are from this community. The allocation that Player 1 has made to Player 2 is written on the slip of paper in front of *[researcher's name]*. Before *[researcher's name]* turns the slip over and shows Player 1's offer to you, you must tell me whether you would:

a) pay $1 to subtract $3 from Player 1's allocation, or

b) pay nothing and leave things as they are.

For each of the possible allocations Player 1 could have made to Player 2. These decisions will determine what Player 1 and you actually receive once we see what Player 1 has done. Please note that you will not get a chance to change your mind after the slip has been turned over.

1. So, if Player 1 allocated $0 to Player 2 and $10 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
2. If Player 1 allocated $1 to Player 2 and $9 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
3. If Player 1 allocated $2 to Player 2 and $8 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave

things as they are?

4. If Player 1 allocated $3 to Player 2 and $7 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
5. If Player 1 allocated $4 to Player 2 and $6 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
6. If Player 1 allocated $5 to Player 2 and $5 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
7. If Player 1 allocated $6 to Player 2 and $4 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
8. If Player 1 allocated $7 to Player 2 and $3 to him or herself would you pay $1 to subtract $3 from Player 1's allocation or pay nothing to leave things as they are?
9. If Player 1 allocated $8 to Player 2 and $2 to him or herself would you pay $1 to subtract from Player 1's allocation or pay nothing to leave things as they are? (see note below)
10. If Player 1 allocated $9 to Player 2 and $1 to him or herself would you pay $1 to subtract from Player 1's allocation or pay nothing to leave things as they are? (see note below)
11. If Player 1 allocated $10 to Player 2 and nothing to him or herself would you pay $1 to subtract from Player 1's allocation or pay nothing to leave things as they are? (see note below)

[Note relating to 9 to 11 above: If Player 3 chose to fine in any of these cases, the following statement was made…] So, if we subtracted $3 from Player 1, instead of Player 1 going home with some money from the game, we would have to go and ask Player 1 to give us some money [*the amounts involved and the math are explained*]. The university that is funding these games has forbidden *[researcher's name]* from doing that. So, what we will do instead is give Player 1 nothing from the game.

[*Occasionally or when it seems necessary give them the following reminder*…] Remember that Player 1's offer is right there on that slip of paper [*slip in front of researcher pointed to*]. Nothing you decide now can change what is written there.

[Once the game is finished the players are called to one-on-one meetings in random order and paid.]

NOTES

1. This precise total (twenty-four) depends on the definition of "site." Some researchers in phase 1 drew samples from two ethnic groups in the same geographic region. For example, two ethnic groups, the Achuar and Quichua, live intermixed in the same village in the Ecuadorian Amazon; we counted this as one site. Meanwhile, in Mongolia, Francisco Gil-White compared Mongols and Kazakhs, who live in different locations; this counted as two sites. Whether we added ten or eleven new sites in phase 2 additionally depends on whether one counts our U.S. site as new. In phase 1, we used an experiment done with UCLA graduate students as our U.S. site. In phase 2, we performed experiments with nonstudent adults in rural Missouri (Ensminger and Cook, chapter 18, available at: http://www.russellsage.org/Ensminger_Chapter18.pdf).

2. Only in Missouri, which was a pilot for this study, were the UG and DG run on different samples. Among the Orma, there was a DG, but no UG (Lesorogol and Ensminger, Chapter 5).

3. Strictly speaking, the DG, which was designed by Daniel Kahneman and his colleagues (1986) and conducted for the first time using real incentives by Robert Forsythe and his colleagues (1994), is not a strategic game, as only one player is active.

4. This is true as long as people sometimes (even rarely) make mistakes or are heterogeneous (and other people know this). There are lots of irrelevant and implausible Nash equilibria in this game if one assumes that decisionmakers are all error-free decisionmakers.

5. The only site with more than a few repeat players in the TPG was Fiji. In chapter 9 (available at: http://www.russellsage.org/Ensminger_Chapter9.pdf), Henrich and Henrich analyze the behavior of their repeat players relative to their first-time players and find no hint of a difference.

6. Benedikt Herrmann, Christian Thoni, and Simon Gächter (2008) have used this model effectively with a diverse student sample.

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Chapter 4

Major Empirical Results: Markets, Religion, Community Size, and the Evolution of Fairness and Punishment

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Building on the theoretical framework laid out in chapter 2 and the background and methods described in chapter 3, this chapter presents our major empirical findings looking across our populations. In chapter 2, we proposed that a particular set of social norms has coevolved with the emergence of markets and the institutions of complex societies in order to facilitate exchange among individuals not involved in durable long-term relationships such as those associated with kinship, reciprocity, and status. Our experiments, with their salient contextual cues of cash and anonymity, are well suited to tap these particular norms. Thus, our framework predicts not only that these context-specific equity norms will vary in strength, but also that the strongest equity norms (measured by offers) will tend to be found in the most complex, market-integrated societies. Further, since theoretical work suggests that such norms can be maintained in larger groups only through costly diffuse punishment, while smaller groups can rely on punishment or other reputation-based mechanisms to sustain such norms, we also expect larger groups to engage in more costly punishment than smaller groups. Our major empirical findings can be summarized in four points:

1. *Fairness and punishment show both reliable patterns and substantial variability across diverse populations.* On the fairness side, as measured by offers, mean offers across our populations ranged from about 20 percent to roughly 50 percent of the stake, spanning one-quarter of the spectrum of possible offers. On the punishment side, the probability of second-or third-party punishment in the ultimatum game (UG) and the third-party punishment game (TPG) always declined as offers increased

from zero to half of the stake, in all populations. However, the willingness of individuals to punish varied across populations, with the fraction of each population willing to engage in costly punishment of the lowest possible offer varying from 3 to 100 percent in the UG and from 26 to 100 percent in the TPG.

2. *Fairness increases with a population's degree of market integration*. Offers in all three experiments increased with market integration (measured as the percentage of calories purchased in the market), even after controlling for a range of economic and demographic variables. The effect of market integration replicates our prior finding involving market integration and UG offers—with eleven new populations added—and extends these findings to two other bargaining games (Henrich,…and Gintis 2004; Henrich et al. 2005a).[1]

3. *Fairness increases with an individual's participation in a world religion.* Compared to those who practice local or traditional religions, participants in Islam or Christianity made higher offers in the dictator game (DG) and the ultimatum game, though the effect is crowded out or otherwise reduced in the third-party punishment game. Overall, as we move from an entirely subsistence-based society with a traditional religion to a fully market-integrated society with a world religion, our measures of market integration and world religion predict an increase in offers of between roughly 20 and 23 percent of the stake in the DG and UG (using OLS regressions). This spans most of the range of variation we observe across mean offers in different populations. In the TPG, the predicted increase is 11 percent.

4. *Willingness to engage in punishment increases with community size.* Our measures of costly punishment in both the UG and TPG show that greater willingness to punish is associated with larger communities, controlling for sociodemographic and economic variables, including market integration and world religion. The estimated effect is dramatic: in the smallest communities (fifty people), the most common preference is not to engage in any costly punishment, while in the largest communities (nearly five thousand people), the most common preference is to punish even small deviations from an equal split (offers of 40 percent).

In this chapter, we lay out the analyses supporting these findings and provide an overall discussion that compares our theoretical interpretations with various alternatives; we then consider some standard criticisms. Our first section discusses the universal patterns and variation observed across our populations for each experiment and analyzes how they diverge from behavioral predictions rooted in pure self-interest. Next, we examine the relationships of market integration and world religions to our offer measures for all three experiments, using a baseline set of seven other economic and demographic predictor variables. We then examine the relationship between community size and our two measures of costly punishment. In each section, we discuss each experimental game in turn and then summarize our findings.

Throughout this chapter, we use terms like "fairness" and "punishment" as a shorthand to describe the motivations and behaviors of our participants. We do not mean to imply, however, that these are context-general or dispositional traits or characteristics of individuals or populations. It remains an empirical question as to how broadly these behavioral patterns apply, though from our theoretical perspective, they may apply only to contexts involving monetary transactions and lacking long-term, relationship-specific demands (for example, status, kinship) or reciprocity motivations. Our experiments probably do not, for example, generally cue and measure the social norms associated with complex kinship relationships, food-sharing, or cooperative fishing. In some societies, however, many interactions may fall into a kind of default category that is most applicable when other norms or motivations do not apply.

UNIVERSAL PATTERNS AND VARIATION IN PROSOCIAL BEHAVIOR ACROSS POPULATIONS

To examine both the universal patterns and the variation observed across our samples, we first present results from the DG, then the UG, and finally the TPG. In presenting these results, we emphasize two patterns that are robust across our samples. First, in all three experiments mean and modal offers for our populations span only a limited range, from 0 percent to 51 percent, with few offers above 50 percent. We did not, for example, find societies in which most people give more than half, or in which most people give zero. This result replicates the findings of the first round of experiments (Henrich,… and Gintis 2004; Henrich et al. 2005a, 2005b) using only the UG.[2]

Second, there is a decline in the likelihood of punishment in the UG and TPG as offers increase from 0 to 50 percent, with 50 percent always showing the lowest likelihood of punishment (which was sometimes tied with other offer amounts as well). Although this declining pattern may seem intuitive for many, our experimental approach could have found a vast set of alternative patterns. We might have found, for example, that the likelihood of punishment in some populations increases as offers approach 50 percent. Or we might have found that the likelihood of punishment increases up to 20 percent, then decreases to 50 percent. Thus, what we actually observed represents only a tiny subset of what was possible. At the other end of the offer spectrum in the UG, we found only two patterns of punishment as offers increase from 50 percent to 100 percent: either there is no punishment of these high offers (or only a sparse scattering) or the probability of punishment *increases* as offers approach 100 percent. Such an increase occurred in six populations out of fourteen. These broad patterns are important because they dramatically reduce the state space of possible explanatory theories.

Within these robust patterns, there is substantial variation across populations. All five of our experimental measures of fairness and punishment show more variation among populations than is typically observed among subjects from industrialized societies. Mean offers vary from 26 percent to 47 percent in the DG, from 25 percent to 51 percent in the UG, and from 20 percent to 43 percent in the TPG. The fraction of each population willing to engage in costly punishment for each population ranges from 3 percent to 100 percent in the UG and from 26 percent to 100 percent in the TPG. At the other end of the punishment spectrum, the willingness to punish UG offers of 100 percent of the stake ranges from 0 percent in many populations to nearly 50 percent of the samples from two populations. We argue that much of this variation reflects the presence and strength of an equity norm (fifty-fifty division) that is applicable to contexts involving ephemeral interactions and money, combined with the locally appropriate sanctioning mechanisms used to enforce such norms (that is, costly punishment or reputation).

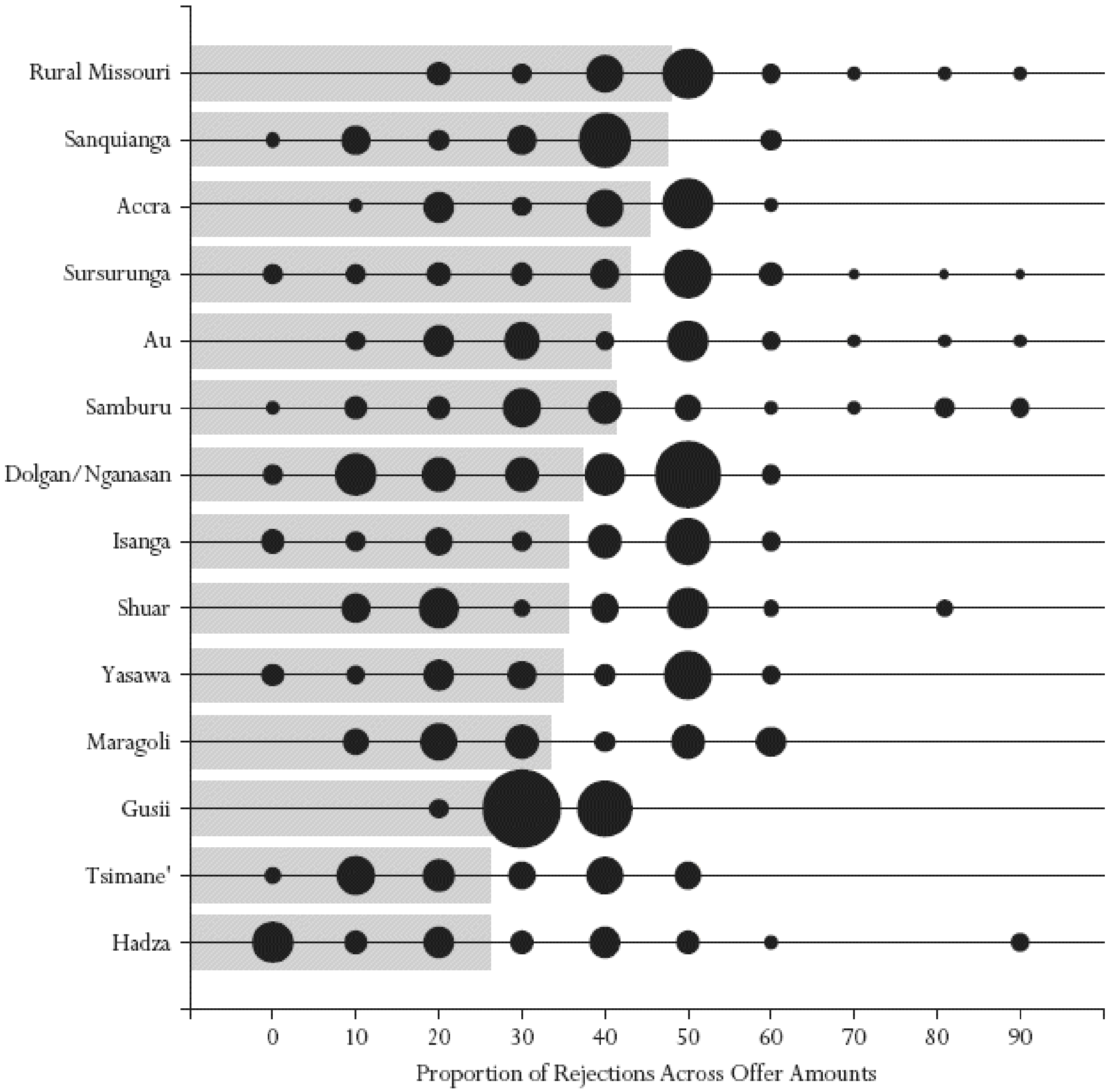
Finally, our findings—taken together and in light of our previous project—show that predictions assuming purely self-regarding preferences fail in all populations studied in all three experiments: either players engage in costly punishment, despite the one-shot nature of the experiments, or they

offer too much, given the likelihood of punishment. In several places many people engage in both violations—punishing at a personal cost and offering too much. It seems that the assumption of pure self-interest fails in different ways, and to varying degrees, in different societies.

The Dictator Game

Figure 4.1 shows the distributions of offers in the dictator game. The *x*-axis gives the possible offers as a percentage of the total stake, with the size of the bubbles at each offer displaying the proportion of that sample that made that offer. Overall, of our 427 DG offers, 5.2 percent (22) are zero, 37.7 percent (131) are fifty-fifty splits, 85.5 percent occur between 10 percent and 50 percent (inclusive), and 9.4 percent are greater than half the stake (40 offers, 21 of which were at 60 percent). Our populations differ in modes, means, and standard deviations. Mean offers range from about 26 percent among the Tsimane' and Hadza to about 47 percent in the United States and Sanquianga. Modal offers are zero among the Hadza, 10 percent for the Tsimane', 20 percent for the Maragoli, 30 percent for the Gusii, and 50 percent in the rest of the populations, except for the Shuar, who show modes at both 20 percent and 50 percent. The standard deviations in offers vary across societies, from 5.4 among the Gusii farmers in the highlands of Kenya to 25.0 among Hadza foragers. Although these data do indicate substantial variability across populations, we emphasize that it is not the case that "anything goes," as few offers above half the stake were observed, and all the population-level variation (mean and modes) is confined to only a fraction of the space of potential variation.

FIGURE 4.1 *The Dictator Game: Distribution of Offers*



Source: Project data.
Notes: Reading horizontally for each of the fifteen populations listed along the left vertical axis, the area of each bubble represents the fraction of our sample that made that offer. Each horizontal set of bubbles thus provides the distribution of offers for each population. The gray bar reaches to the mean offer for each population and is the measure by which the table is sorted. Three offers of 100 percent, two from the Dolgan/Nganasan and one from Accra, are not shown.

The prediction of models based on pure self-interest in the DG—offers of zero (Camerer and Fehr 2004)—is not well supported overall. Only about 5 percent of all offers were zero, and 41 percent of those occurred among the

Hadza. The modal offer among the Hadza is zero, although 71 percent of Hadza offered more than zero. We note that the assumption of fully self-regarding preferences is more strongly supported than the assumption of fully other-regarding preferences, as only three individuals out of our 427 offered 100 percent of the stake. Fortunately, current models do not require us to pick between these two extremes (Camerer and Fehr 2006), but instead allow us to theorize and measure the mix of motivations in decisionmaking.

Those familiar with DG results from university student samples will observe that our nonstudent adults, especially our Americans, are substantially more prosocial than typical students. Several lines of converging evidence indicate that this difference probably arises from the fact that students' prosocial preferences are still developing and have not yet hit their adult plateau. First, several dictator games done by different researchers in nonstudent (older) adult pools in the United States and Switzerland show the same pattern we found (Carpenter, Burks, and Verhoogen 2005; Henrich and Henrich 2007)—mostly fifty-fifty offers—in contrast to the typical student findings. Second, we performed our DG protocol among both American students (see chapter 9) and nonstudent adults in rural Missouri (see chapter 18). Our Missouri findings match other nonstudent U.S. adult samples, and our student results match typical student findings—that is, it is not our specific protocol that is causing the prosociality. Third, as noted in chapter 2, research explicitly examining behavioral experiments across the life span show that other-regarding preferences in Westerners develop slowly (Harbaugh and Krause 2000; Harbaugh, Krause, and Liday 2002), change over the university years (Carter and Irons 1991), and do not plateau until at least the midtwenties (Henrich 2008; Sutter and Kocher 2007).

The Ultimatum Game

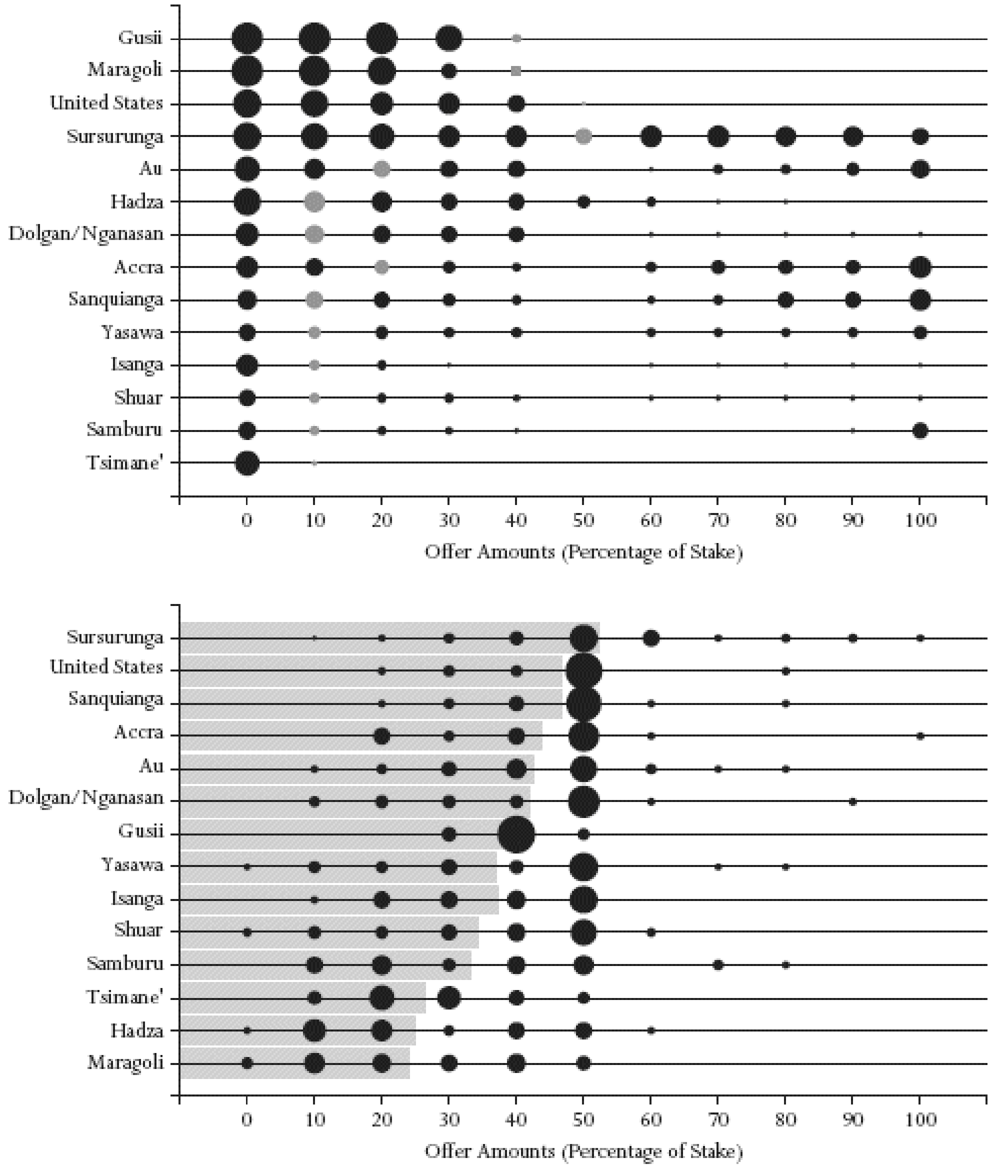
We begin with punishment in the ultimatum game as measured by people's willingness to reject offers. The top panel of figure 4.2 displays the distribution of rejections (punishments) across potential offers, and the bottom panel shows the distribution of UG offers. Reading the top panel horizontally for each population, the size of the bubble at each possible offer (listed along the *x*-axis) represents the proportion of that sampled population who indicated that they would reject that offer amount. The figure shows

that the likelihood of rejection is highest for offers of zero and declines as offers approach 50 percent. For offers above 50 percent, there are two patterns. Either there are no, or only a few, scattered rejections or the probability of rejection increases as offers increase from 60 percent to 100 percent of the stake. We term this willingness to reject offers greater than 50 percent “hyper-fair punishment” and discuss it at greater length later in the chapter.

The variation among populations in their willingness to reject lower offers can be captured in at least three different ways. First, consider the variation in the proportion of each population who were willing to reject offers of 10 percent, an offer representing the cheapest punishment that still costs the responder some money. (Rejecting an offer of zero does not cost the responder anything.) Overall, 57 percent of players rejected 10 percent offers. However, in four populations—the Tsimane', Shuar, Isanga Village, and Samburu—fewer than 10 percent of people rejected offers of 10 percent. In contrast, 65 percent or more of the samples from four populations rejected such offers. In the top panel of figure 4.2, the populations are listed from top to bottom in order of decreasing willingness to reject offers of 10 percent.

A second way to compare punishment across populations is to use the pattern of rejection responses to calculate the income-maximizing offer (IMO) for each population. This is the offer that a proposer would make if he or she wanted only to maximize his or her own income and knew the probability of rejection for each possible offer (and could do all the necessary mental calculations). The IMO for each population is marked in gray in the top panel. IMOs range from 50 percent in the United States and among the Sursurunga to 10 percent among five other populations. That is, in five societies the threat of punishment is insufficient to drive an income-maximizing proposer above the theoretical prediction for offers (10 percent), based on pure self-interest.

FIGURE 4.2 *The Ultimatum Game: Distribution of Rejections (top) and Offers (bottom)*



Source: Project data.

Notes: The top panel shows the frequency of rejections across offers in the UG for each population. The bubbles' areas represent the portion of the sampled population (listed along the *y*-axis) who rejected offers at the amounts marked along the *x*-axis. The largest bubbles indicate that 100 percent of the sample rejected. Gray bubbles mark the income-maximizing offer (IMO). The square marks the IMO for the Maragoli, who made no rejections at that offer amount. The populations are ordered from bottom to top according to the frequency of rejections for offers of 10 percent of the stakes. No rejection data were collected for offers above 50 percent in the U.S. sample (see Chapter 3). The bottom panel shows the histogram of offers and mean offers for each population. The bubbles' areas represent the relative frequencies of offers at each of the amounts listed along the *y*-axis. The horizontal gray bars reach to the mean offer for each population. The populations are ordered by mean offer amount.

Our third approach compares the accept/reject decisions for each individual across offers to assign a minimum acceptable offer (MinAO) to

each player. An individual's MinAO is the lowest offer that he or she is willing to accept. If a player accepts all offers between 0 percent and 50 percent, his or her MinAO is zero. If the player rejects 0, 10, and 20 percent but accepts 30, 40, and 50 percent, his or her MinAO is 30.[3] While the overall mean MinAO is 16, mean MinAOs for each population range from 6.1 among the cattle-herding Samburu to 27.9 in the United States.

For offers above 50 percent, we also observe variation across populations in people's willingness to engage in punishment. Of our fourteen populations, six displayed an increasing willingness to reject increasingly inequitable UG offers as they rose from 50 percent to 100 percent. Of those who showed this tendency, the fraction of the sample willing to reject offers of 100 percent ranged from 20 percent among Fijians to 50 percent in Accra, Ghana. We explore this phenomenon in more detail later (see also Henrich et al. 2006).

With regard to the universal patterns and variation in UG offers, the bottom panel of figure 4.2 provides histograms (in the form of bubbles) for the distribution of offers in each population. The gray horizontal bars show that mean offers range from around 25 percent of the stake among the Maragoli, Hadza, and Tsimane' to 51 percent among the Sursurunga.[4] Modal offers range from 10 percent among the Maragoli and Hadza to 50 percent in several societies. Eighty-four percent of all offers occur between 20 percent and 50 percent of the stake (inclusive), while only 6.8 percent of all offers are over 50 percent, and most of these came from New Guinea (Sursurunga and Au). Of these hyper-fair offers, half are offers of 60 percent of the stake.

Are Hyper-Fair Rejections Just Confusion?

Many researchers find the existence of hyper-fair rejections non-intuitive. To address this we explored the possibility that, despite our one-on-one testing procedures, those who rejected high offers might have somehow misunderstood the game. For every player 2 in the UG we counted the number of rejections for offers greater than 50 percent and ran two regressions. First, we used a negative binomial regression with robust standard errors to regress this count variable on education (measured in years of formal schooling). If those who rejected hyper-fair offers did so because of some misunderstanding regarding the game, we might expect more-educated people to have a better understanding and thus have fewer

hyper-fair rejections. The coefficient, standard error, and *p*-value for education are −0.020, 0.029, and 0.49, respectively. Adding population dummies to remove any between-group variation yields a coefficient, standard error, and *p*-value of −0.0042, 0.045, and 0.92, respectively. Similar results obtain if one uses standardized value for education, as we do later in the chapter, to deal with regional differences in educational quality. Finally, if we include only those six populations showing an increasing tendency to reject as offers approach 100 percent, we obtain similar results to those found in the first regression. In short, we find no evidence that more-educated individuals are less likely to make hyper-fair rejections.

Our second test of the confusion hypothesis was to regress our hyper-fair rejections variable on the number of examples and test questions used, which provides a potential proxy for how much effort was required in explaining the game, as it was conveyed through repeated examples and test questions. Using a negative binomial regression with robust standard errors, the coefficient, standard error, and *p*-value for this predictor are −0.16, 0.072, and 0.03, respectively. Here the coefficient is negative, indicating that those who required more examples to learn the game (that is, had a tougher time understanding it) made fewer hyper-fair rejections. This is opposite to the prediction of the "confusion explanation."

Third, postgame interviews of players who punished high offers in the UG reveal that people understood the game and made sensible responses as to why they rejected high offers, such as, "It was too much, I cannot accept that much."

Finally, alongside these findings are a few other empirical patterns that contradict the notion that hyper-fair offers are a product of confusion or misunderstanding. To begin, in the TPG, which was generally more difficult to explain and took longer for players to comprehend (more examples), people did not punish hyper-fair offers. A look at the TPG explains why. If player 1 offers the full amount (100 percent) to player 2, player 3 cannot punish player 1 because we did not allow negative payoffs (and player 3 is not permitted to take money away from player 2). Player 3 could pay 10 percent of his or her stake, but this would not take any money away from player 1. If player 1 gives 90 percent to player 2, player 3 could pay 10 percent to take 10 percent away from player 1, but this is very inefficient punishment. It is not until player 1 gives 70 percent to player 2—that is, when matters are much less inequitable—that player 3 can administer the

full brunt of his or her punishment to player 1. Consequently, punishment was not expected for high offers in TPG, and very little was seen. However, if the punishment of hyper-fair offers in the UG was the result of confusion, it is not obvious why similar confusions did not manifest themselves in hyper-fair rejections in the TPG. In fact, since the TPG was more difficult to understand than the UG, we would have expected more punishment of hyper-fair offers, if confusion was the reason.

The patterns of hyper-fair rejections observed in our data are consistent with those from UG experiments done in other non-Western societies by other researchers, as well as with nonstudent adults in the West and with Western undergraduates when more sensitive experimental tools are used. In Tatarstan and Sakha-Yakutia (Russia), Donna Bahry and Rick Wilson (2006) used our protocol and found the same patterns of hyper-fair rejections. Their analyses parallel ours in showing that confusion is unlikely to explain the presence of the phenomenon. Similarly, in China, Heike Hennig-Schmidt, Zhu-Yu Li, and Chaoliang Yang (2008) found hyper-fair rejections in UGs. Research among representative adult samples (nonstudents) in three countries in Europe using the UG has also revealed this tendency for hyper-fair rejections among nonstudent adults, though it is substantially weaker than in many of the non-Western populations discussed here (Bellemare, Kröger, and van Soest 2008; Güth, Schmidt, and Sutter 2003; Wallace et al. 2007).[5] Among Western undergraduates, milder versions of this phenomenon have been detected using bargaining instruments that permit the expression of weaker preferences for hyper-fair punishment in the responder (Andreoni, Castillo, and Petrie 2003; Huck 1999).

When applying the standard UG (not involving the strategy method) in phase 1 of the project, we observed hyper-fair rejections only among the Au and the Gnau of Papua New Guinea. We were able to observe this previously only among the Au and Gnau because these two groups, unlike the other populations studied in phase 1, showed some substantial willingness to make actual hyper-fair offers; hyper-fair rejections can only be observed in the standard form of the UG (see chapter 3) if actual hyper-fair offers are made. Our findings with the Au reported herein (chapter 7) replicate our previous efforts (Tracer 2003, 2004), while the Sursurunga findings, another New Guinea population that was added precisely to give more insight into this phenomenon, extend our observations and suggest some degree of regional generality (chapter 11). Like the Au and Gnau, the Sursurunga both make

and reject hyper-fair offers. In fact, they make hyper-fair offers with sufficient frequency that they are the only population in phase 2 with a mean offer greater than 50 percent.

Self-interest and Risk Aversion in the Ultimatum Game

Despite the behavioral variation just described, we found that none of our populations conformed to the predictions of the oft-discussed model based on purely self-regarding preferences (Camerer 2003). This approach predicts that responders will accept any positive offer and thus proposers will make the smallest positive offer. Across our populations, responders either rejected positive offers or proposers offered too much, given the probability of rejection across offers. Four populations both rejected positive offers and gave too generously. Focusing on the rejection of offers of 10 percent (the cheapest opportunity for costly punishment), we calculated exact 95 percent confidence intervals (CIs) for each population and found that all populations except the Tsimane' could be distinguished from a zero probability of rejection at this offer amount. This remains true even if we calculate exact 99 percent CIs. Thus, strictly on the basis of responder behavior, our data indicate that all of the societies studied, except the Tsimane' responders, violate the narrow economic self-interest assumption in the UG. This is important because unlike the proposer, for whom we assume the possession of accurate beliefs about the likelihood of rejection across offers, the responder's decision to forgo free money is not contingent on anticipating another's behavior. There are many potential reasons why the self-regarding model might be failing here, including that the responders have inaccurate beliefs about the anonymity in the games, or that many people are motivated to punish low offers in this context.

On the proposer side, of our fourteen societies, four had either mean or modal offers near their income-maximizing offer. Of the remaining ten populations, nine had modal and mean offers above their IMO. For these nine, it may be that risk aversion—a standard modification of the self-regarding model—explains why mean and modal offers are higher than the IMO. For example, suppose a subject estimates that an offer of 40 percent of the pie will be accepted for sure (leaving 60 percent for the proposer) and that there is a two-thirds chance that an offer of 10 percent will be accepted. If this subject is risk-averse, he or she might value the certainty of keeping

60 percent of the pie more than the two-thirds chance of keeping 90 percent (and a one-third chance of getting nothing). In this case, the expected monetary gain is the same for the two offers (namely, 60 percent of the pie), but the expected utility of the certain outcome is greater. Thus, a risk-averse subject might make a high offer even if the probability of rejection of a low offer is small.

To examine this we assume that the utility (U) that individuals derive from money (I) is concave, such that $U = I^r$, where r provides a standard measure of risk aversion. If $r = 1$, people are risk-neutral; if $r < 1$, people are risk-averse; and if $r > 1$, people are risk-seeking. For each of the populations, we recalculated a utility-maximizing offer (UMO) by calculating the value of r closest to 1 that minimized the difference between the utility-maximizing offer and the (a) mean and (b) modal offers for each population. We assumed that proposers knew the actual (empirically observed) probabilities of rejection across offers for their group.

Using this approach, we found that five of our remaining ten populations required implausibly low values of r, two were somewhere in the middle, two obtained plausible values of r, and one required an r value that was implausibly high. For the first five populations, including the Tsimane', we found that r (for both mean and mode) was less than 0.3, an implausible amount of risk aversion. The five populations with implausibly low values of r are Isanga Village (r = 0.22), the Samburu (r = 0.18), the Shuar (r = 0.18), the Tsimane' (r = 0.26), and the Yasawans (r = 0.27).[6] To see how implausible such values are, a person with r = 0.27 would prefer a certainty of $1 over an even chance at $12 (yielding $6 on average). If this person faced five of these choices each week, he or she would earn $5 a week compared to the mean of $30 earned by someone with r = 0.4. Putting these five populations aside, two others require fairly low values of r, although these do not seem completely implausible (for the Accra r = 0.47, and for the Sanquianga r = 0.54). The Au and Dolgan/Nganasan require plausible values of r, 0.76 and 0.72, respectively. With regard to the self-regarding model and the potency of risk aversion in explaining our findings, this analysis parallels our previous work using the data from phase 1 (McElreath and Camerer 2004).

It is worth noting that work using experiments designed to measure risk preferences in small-scale societies, including African agro-pastoralists and South American subsistence farmers, have not revealed levels of risk

aversion anywhere near these values (Henrich and McElreath 2002). Moreover, efforts to establish a link between measures of risk preferences derived from risk experiments and offers above the local IMO have failed (Henrich et al. 2005a).

Lastly, in contrast to all other populations, the Maragoli had an IMO greater than their mean and modal offers in the UG. Following the same logic as earlier, we estimated the lowest value of *r* that would bring the utility-maximizing offer into correspondence with the actual mean and modal offers. The amount of risk-seeking required to accomplish this is extremely implausible. The value of *r* estimated was 13.7, meaning that the Maragoli would pass up $10 for certain in favor of a 50 percent chance at $10.50 (or zero). In chapter 12, Gwako provides an extended discussion of the Maragoli research and the unique situation of this population.

Overall, these findings replicate our team's previous research using the standard UG (Henrich,…and Gintis 2004; Henrich et al. 2005a). Despite employing a uniform methodology across sites that differs from the methodology used in phase 1 and using the strategy method (eliciting responses for all possible offers), our new findings still parallel those of phase 1 in four important ways. First, the broad patterns of variation across our societies are the same. The ranges of mean and modal offers are similar. Second, the earlier findings from the Hadza, Tsimane', and Au, which were each aberrant in different ways, have largely been replicated in these new experiments, with the same patterns reemerging. The Hadza again made relatively low offers, but punished sufficiently that their mean and modal offers were close to their IMOs. The Tsimane' again did not reject, and made low offers, as did some Tsimane' villages in Gurven's previous work. The Au were again willing to reject low offers and make high offers (including offers even greater than 50 percent), and they were also willing to reject offers greater than 50 percent with increasing probability. Our second New Guinea population also revealed these same unusual patterns, even more strongly than the Au. Finally, as detailed later, we replicated the relationship between market integration and UG offers. These parallels between the results from phases 1 and 2 suggest that our methodological decision to play the UG after the DG in phase 2 probably had no important impact on the overall pattern of results, except perhaps in the case of the Maragoli (see chapter 12).

The Third-Party Punishment Game

The third-party punishment game reveals patterns similar to those already seen in the DG and UG. With regard to punishment, all our populations showed at least some willingness to punish low offers, with the likelihood of punishment declining as offers increased (see top panel of Figure 4.3). There was substantial variation, however, in individuals' willingness to punish across populations. This can be illustrated, first, by considering the frequency of punishment for the lowest offers, and second, by using minimum acceptable offers (paralleling the treatment for the UG). For offers of zero, two-thirds of all player 3s were willing to pay to punish. Across populations, this fraction varied from around 26 percent among the Tsimane' to over 90 percent among the Samburu and Maragoli and 100 percent for the Gusii; see the top panel of figure 4.3 at zero on the *x*-axis. (Note that we do not have TPG results for U.S. nonstudent adults, but see chapter 9 for U.S. students.) Next, using each player's vector of punish or do-not-punish decisions across offers, we were able to calculate a minimum acceptable offer for 90 percent of our sample. The MinAO in the TPG represents the lowest offer for which a player will not punish. Mean MinAOs range from about 4 percent among the Tsimane' to 41 percent among the Gusii, giving a mean across populations of 21 (the mean of sample means).

As noted earlier, the design of this experiment precludes us from observing the kind of hyper-fair punishment that was observed in the UG. In our rules for this game, player 3 could not reduce the final payoff of player 1 below zero because—for practical reasons—we could not deliver negative payoffs to our participants. This means that for high offers, punishing was neither an effective means to reduce player 1's payoff—that is, to punish him—nor a way of rectifying inequity among players. Assuming that the motive behind punishing has something to do with either reducing inequity or hurting player 1 for non-prosocial behavior, we would expect few to punish at high offers. Few did. Out of our 338 player 3s, four people punished offers of 100 percent, and the same four punished offers of 90 percent. These four were spread among three populations: Fijians, the Hadza, and the Shuar.

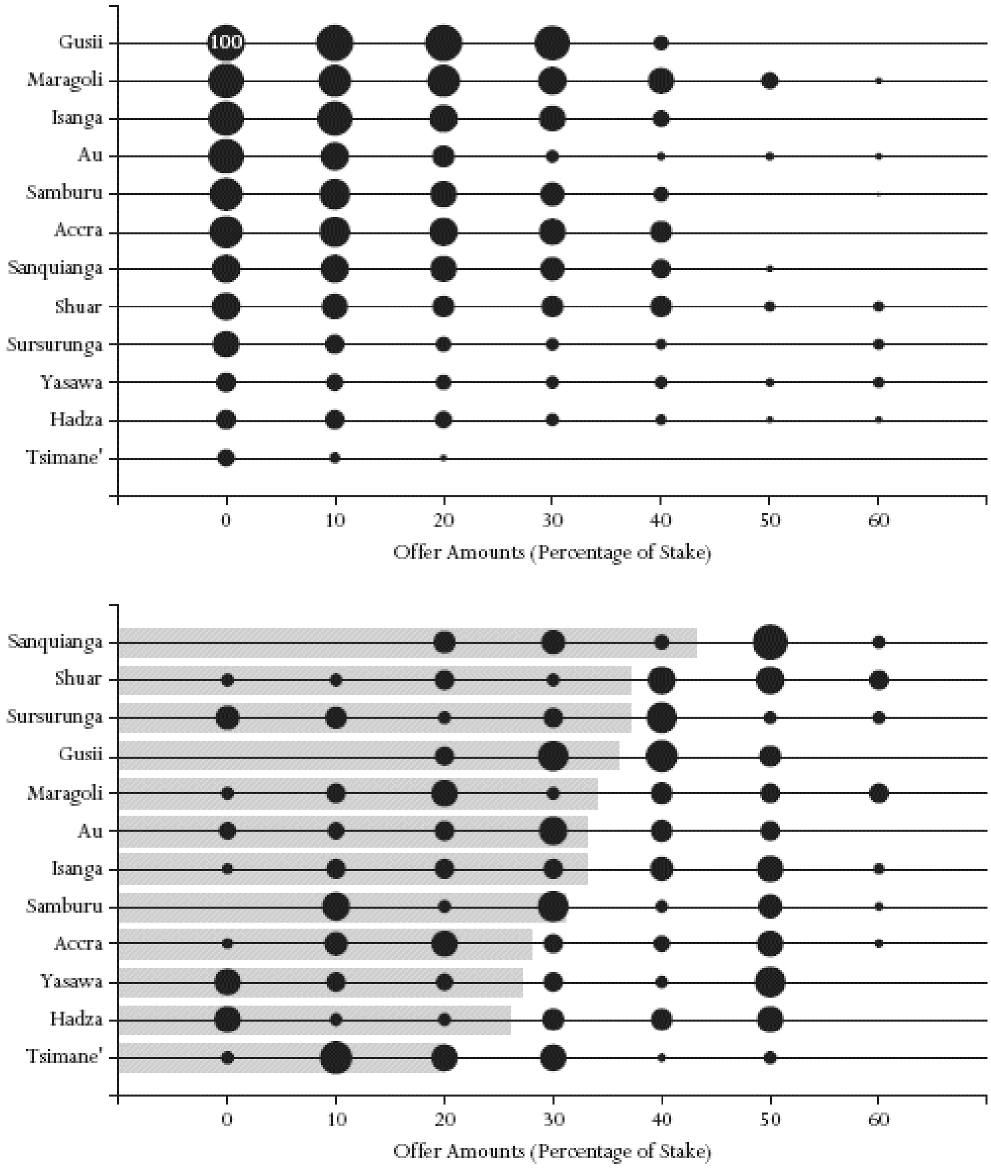
The distribution of offers in the TPG parallels the results described for the UG and DG, although offers were generally a bit lower (see Figure 4.3 bottom). Ninety-four percent of offers were between 0 percent and 50 percent of the stake (inclusive). Twenty-three percent of people offered 50 percent, which was the overall modal offer. Of the twenty-two people who offered more than 50 percent, thirteen made offers of 60 percent. Mean

offers in the TPG ranged from 20 percent among the Tsimane' to 43 percent in Sanquianga; modal offers ranged from 10 percent among the Hadza to 50 percent in several other societies.

As with the UG and DG, the predictions derived from an assumption of narrow economic self-interest do not fare well in the TPG. A standard prediction assuming pure self-interest is that player 3 will not reduce his or her income in this one-shot interaction by paying to punish. Player 1, recognizing the situation of player 3, should offer zero to player 2. With regard to punishment, 95 percent exact confidence intervals show that the probability of punishment in every population studied can be distinguished from zero. The populations with the lowest likelihoods of punishment for an offer of zero are the Tsimane', with 26 percent of players punishing (at 95 percent CI, 10 to 48 percent), and the Hadza, with 27 percent punishing (at 95 percent CI, 12 to 48 percent). Since the IMOs for all populations were zero—reflecting the relatively limited abilities of punishers to inflict penalties on low offers[7]—all the offers were too high from the point of view of the typical self-regarding predictions. The lowest mean offer was 20 percent, and the lowest modal offer was 10 percent.

As in the UG, we again consider how a standard modification of the self-regarding model—the consideration of differing risk preferences as captured by the concavity of utility with increasing income—might allow us to better predict offers. As before, we assumed a standard relationship between utility and income, $U = I^r$, and estimated r based on the observed probabilities of punishment and the mean and modal offers for each population. It turns out that there are no positive values of r that will budge the utility-maximizing offer from zero. Adding risk aversion, at least in this specification, adds no explanatory power.

FIGURE 4.3 *The Third-Party Punishment Game: Distribution of Punishments (top) and Offers (bottom)*



Source: Project data.

Notes: The top panel displays the distributions of decisions to punish across the possible TPG offers. For each population labeled along the *y*-axis, the areas of the bubbles display the fraction of the sampled population who were willing to punish at that offer amount (along the *x*-axis). Inside the zero offers for the Gusii we placed a "100" to indicate the size of a bubble if everyone punished. The populations are ordered according to their willingness to punish offers of zero. The bottom panel provides the histogram for offers made in each population. The area of each bubble represents the fraction of the sampled population who made the offer. Both plots stop at offers of 60 percent along the *x*-axis because very little punishment and few offers occurred above this amount. Populations are ordered according to their mean offers.

In table 4.1, we summarize the mean statistics on offers and rejections by game and society.

EXPLAINING THE VARIATION: MARKET INTEGRATION, RELIGION, AND COMMUNITY SIZE

This section analyzes the variation in our five experimental measures to test the three hypotheses presented in chapter 2, which were derived from considering the coevolution of social norms, institutions, and intrinsic motivations in an economic-evolutionary framework. Our framework proposes that global environmental shifts to a more stable climate regime at the beginning of the Holocene period (twelve thousand years ago) created possibilities for the emergence of larger-scale sedentary human societies, conditions that at most had existed only ephemerally during the preceding hundred thousand years. We argue that a crucial impediment to the emergence of these more complex and evolutionarily novel, larger-scale societies was the development of the social norms and institutions (informal and formal) that were capable of domesticating our evolved social psychology and had adapted over tens of millennia for life in small groups (families, bands, and tribes). We hypothesize that increasingly complex societies prospered to the degree that norms and institutions sustained more intense social interactions in larger and larger social and economic spheres, well beyond the familiarity of the local sphere of durable relationships. It is these norms and institutions—and their gradual internalization over the life course as intrinsic motivations—that recalibrate and harness our evolved social psychology, thereby allowing individuals to successfully interact in larger-scale contexts and outside tightly knit social networks. By incrementally facilitating trust, fairness, and cooperation in an increasingly diverse array of interactions beyond the local group, these emerging norms permitted social groups to make more productive use of diverse skills, knowledge, and resources, as well as gradually increasing cooperation in exchange, defense, public works, and internal policing (such as reducing crime).

One important element in the evolution of societal complexity is the expansion of both the breadth and intensity of market exchange. At its most efficient, market exchange requires trust, fairness, and cooperation among individuals engaged in infrequent, ephemeral, or anonymous interactions. The greater the degree to which expectation-motivation sets related to trust, fairness, and cooperation are shared, the lower the transaction costs and the higher the expected rewards. However, studies of both nonhuman primates

and small-scale societies suggest that during most of human history transactions beyond the local group, and certainly those beyond the ethnolinguistic unit, were often fraught with danger, mistrust, and exploitation.[8] Reliable transactions among strangers are commonplace for many people today, but they probably have not always been part of human evolutionary history. Thus, in refining our theoretical proposal, we suggest that market norms may have evolved as part of this overall process to facilitate and extend mutually beneficial interactions in contexts where established and ongoing social relationships (based on kinship or reciprocity, for example) could not be fully relied upon.

Our behavioral experiments are well suited to tap exactly these “market norms,” as they involved both money and anonymity. Money is most frequently used in market transactions and at least in some circumstances signals a desire to avoid a longer-term nonmarket relationship.[9] Owing to the anonymity in our games, players lack the cues necessary to apply the expectations and motivations associated with other kinds of relationships (Fiske 1992), such as those based on kinship, reciprocity, or status. However, we emphasize that the norms tapped by our experiments may apply more broadly than to just “market exchanges”: they may deal with any interactional circumstance not governed by some other form of longer-term social relationship. Such norms may act as the default expectation-motivation sets in some societies whenever relationship-specific information is lacking. As noted earlier, understanding the contextually circumscribed nature of these norms is important because we do interpret our findings as capturing, not anything dispositional about individuals' or societies' general tendencies, but only something about their motivations and expectations in this context (exchanges involving money and anonymity). Suggesting the existence of a default set of rules is different from making a dispositional attribution.

TABLE 4.1 *Mean Summary Statistics on Offers and Rejections, by Society*

Society	Dictator Game Offer	Standard Deviation (N)	Ultimatum Game Offer	Standard Deviation (N)	Third-Party Punishment Game Offer	Standard Deviation (N)	Ultimatum Game Phase 2 Minimum Acceptable Offer	Standard Deviation (N)	Third-Party Punishment Game Phase 3 Minimum Offer Not Fined	Standard Deviation (N)
Accra	42	16.9 (30)	44	15.9 (30)	28	16.8 (39)	13	17.3 (30)	28	17.7 (36)
Au	41	19.6 (30)	44	14.5 (30)	33	23.5 (30)	20	21.0 (30)	31	20.0 (30)
Dolgan/ Nganasan	37	20.8 (30)	43	16.2 (30)	n.a.	n.a.	17	20.2 (26)	n.a.	n.a. n.a.
Gusii	33	5.4 (25)	40	4.5 (25)	36	9.4 (30)	38	5.8 (25)	41	5.5 (30)
Hadza	26	25.3 (31)	26	16.6 (31)	26	19.4 (27)	17	17.4 (26)	8	15.0 (24)
Isanga	36	18.3 (30)	38	12.6 (30)	33	17.1 (20)	7	10.1 (30)	33	14.5 (19)
Maragoli	35	17.1 (25)	25	15.6 (25)	34	20.8 (30)	30	7.6 (25)	33	16.6 (23)
Orma	42	15.0 (26)	n.a.	n.a. n.a.	n.a.	n.a. n.a.	n.a.	n.a. n.a.	n.a.	n.a. n.a.
Samburu	40	23.2 (31)	35	19.1 (31)	31	18.0 (30)	6	12.3 (31)	19	10.9 (26)
Sanquianga	47	15.6 (30)	48	10.1 (30)	43	16.0 (32)	12	18.1 (30)	24	21.6 (31)
Shuar	35	19.1 (21)	37	16.5 (21)	37	17.9 (15)	7	13.9 (20)	19	22.2 (15)
Sursurunga	41	18.6 (30)	51	16.3 (30)	37	18.9 (32)	25	20.6 (21)	10	14.6 (25)
Tsimane'	26	15.5 (38)	27	11.1 (36)	20	13.3 (27)	7	5.4 (33)	4	7.8 (23)
U.S./rural Missouri	47	10.3 (15)	48	10.3 (26)	n.a.	n.a. n.a.	28	19.5 (28)	n.a.	n.a. .
Yasawa	35	17.9 (35)	40	17.5 (34)	27	20.4 (30)	7	13.8 (32)	4	7.8 (23)
Total	37	18.9 (427)	39	16.5 (409)	32	18.6 (342)	16	18.0 (387)	22	19.3 (305)

Source: Project data.
Note: This table provides summary statistics for our three experiments.

If this line of reasoning is correct, we should expect market integration and fairness norms (offers closer to fifty-fifty) to coevolve such that they are positively correlated across societies. Some might wonder why fifty-fifty is the predicted market norm. We theorize that market norms evolved to allow people to successfully interact without either party having any background information on the other. In the absence of any differentiating information, either about the situation or the other individual, neither party has a claim to more than half.

Since this hypothesis derives from a cultural-institutional evolutionary process, there is no unidirectional causality. Societies with stable market norms readily expand such that those social groups in contact with market societies will be inclined to adopt, and eventually internalize, these prosocial norms. At the same time, those social groups that already possess suitably appropriate norms for market engagement will be better able to readily engage in successful market interactions (and thus be more market-integrated). In short, we expect that greater market integration will be associated with higher offers in all three experiments.[10] Replicating our earlier UG findings, our new findings presented here support this prediction for offers in all three experiments.

Second, as detailed in chapter 2, we also explore the hypothesis that religious beliefs, rituals, and institutions coevolved with the norms and nonreligious institutions that support larger-scale complex societies (Atran and Henrich 2010; Shariff, Norenzayan, and Henrich 2010). The idea is that cultural evolution increasingly favors potent, moralizing high gods, who, along with the institutional and ritual machinery for instilling and maintaining such beliefs (Henrich 2009), incentivize prosocial behavior toward coreligionists with a range of rewards and punishments, including afterlife incentives. Empirically, anthropological work shows that the presence of high moralizing gods increases with greater societal size and complexity (Roes 1995; Roes and Raymond 2003). Small-scale societies often possess only local, relatively weak, highly anthropomorphic gods who lack moral righteousness (they do both good and bad things from the local's perspective), are unreliable and unpredictable, and cannot—for example—grant eternal life in paradise. Thus, in contrast to the religions that are likely to have dominated most of human history, the Abrahamic religions of Christianity and Islam that have spread globally in the last few thousand years provide a powerful moralizing god who is believed to be dominant over all peoples, omniscient, and equipped with ample powers to reward and punish, including decision authority to provide individuals with eternal bliss or everlasting suffering (Wright 2009). Such religions may have emerged—through a variety of potential processes—to buttress the emerging social norms and institutions that support cooperation in increasingly large-scale societies. In both dictator and ultimatum games, players who report practicing either Christianity or Islam offered more than those professing a traditional local religion.

Finally, in chapter 2 we also discussed theoretical work that uses tools from evolutionary game theory to show how different kinds of mechanisms can stabilize prosocial norms, such as those creating fairness and trust outside of durable longer-term relationships. Roughly speaking, the work shows at least two different classes of norm-stabilization mechanisms: one involving reputational effects in which norm-violators are sanctioned in other interactions through, for example, the withdrawal of help in dyadic exchanges, and a second involving the use of costly punishment (which can work with or without reputational systems). Since the effectiveness of reputational systems in sustaining norms degrades rapidly as communities expand (roughly with the natural logarithm of community size), this research predicts that in large communities norms must be maintained by costly punishment. Thus, in large communities at least some people will have internalized a greater taste for costly punishment, while smaller communities will tend to rely on either costly punishment or indirect sanctioning mechanisms that operate via reputations. The prediction is that costly punishment as measured in our two experiments, increases with community size. And since some theoretical work suggests that reputational breakdown is roughly proportional to the natural logarithm of the group size (Cancho, Solé, and Köhler 2004), we use both community size and the natural logarithm of community size as the key theoretical predictor of variables. This effect emerges in both of our measures of second-and third-party punishment and is robust to the inclusion of demographic and economic control variables, including market integration.

We first study a series of linear regression models that examine the relationship between offers in each game and our variables measuring market integration and participation in a world religion. Then we explore the question of why the predictive effects of participation in world religion disappear in the TPG, while at the same time substantial effects for some economic variables, specifically income, wealth, and household size, emerge as potent predictors of TPG offers. In the next subsection, we examine the relationship between willingness to punish and community size by looking at results from both the UG and TPG. For theoretical reasons, we examine both the effects of community size and the natural logarithm of community size.

Explaining the Variation in Offers

In exploring the variation in offers, we first analyze all the offers together from all three games and then analyze the offers from each game separately. Offers are measured as a percentage of the stake. Our baseline model regresses offers on nine predictor variables: market integration (MI), world religion (WR), age, sex, education, income, wealth, household size (HS), and community size (CS). MI measures market integration as the percentage of the diet in calories purchased in the market, as opposed to homegrown, hunted, fished, or gathered calories. As explained in chapter 3, we use the average MI for each individual's community (village, camp, and so on). WR is an individual-level binary variable, with “1” indicating participation in Islam or Christianity and “0” indicating the practice of a local or traditional religion, or a report of no religion. Our income and wealth measures are derived from detailed protocols eliciting data disaggregated by source (see chapter 3) and have been converted to U.S. dollars and scaled to units of $1,000. Income is measured at the individual level and wealth at the household level. Age is measured in years at the time of the experiment. For education, we created standardized values (with mean zero and standard deviation one) within each population based on self-reports of the number of years a player had spent in formal schooling. We did this because one year of formal schooling is unlikely to be even roughly equivalent across these diverse societies. This approach allows us to get the most from the substantial within-population variation in formal education in our samples. Community size (CS) is the number of individuals (in units of one hundred people) in the local social group, usually a village (though camps were used for the Hadza and the town in Missouri).[11] In most of our populations we sampled from two or more local villages or camps.

In addition to analyses involving these variables, we ran a variety of supplemental analyses. To address the comparability of our income and wealth variables across such diverse populations we performed two sets of supplemental regression analyses that were run in parallel to those shown here, in which our absolute income and wealth measures were replaced with alternative measures. First, income and wealth were replaced with the same variables scaled to the local means and standard deviations for each population, giving us locally relative measures of income and wealth. This allowed us to detect effects based on relative differences in income and wealth. Second, by converting our income and wealth variables into U.S. dollars based on the international exchange rates at the time of the

experiments, we might have introduced distortions from their real values based on local purchasing power. Such distortions could have resulted from several factors, including the distance of many of our sites from large market centers (where exchange rates are set) or ephemeral fluctuations in world exchange rates that were unconnected to the material conditions on the ground at our sites. To address this each researcher compiled a list of the local prices at the time of the experiments for twenty-seven commonly used items, including several staples. From this list we found five items that were present in all field sites and were purchased, at least occasionally: sugar, salt, rice, D-cell batteries, and cooking oil. Using the local prices of these items for each site, we converted our measures of income and wealth from the local currency into quantities of each of these items, giving us five new income and wealth variables now measured in quantities of these local consumables. For example, if a subject's yearly income was 1,000 shillings and sugar was locally priced at 5 shillings per kilogram, we converted that person's income measure to 200 kilograms of sugar. That is, he or she could purchase 200 kilograms of sugar locally with his or her yearly income. This approach avoids the use of international exchange rates and grounds people's income and wealth in the kinds of products that are commonly purchased in these locations. We do not present these supplementary regression analyses here. In general they robustly support the conclusions drawn from the analyses presented here.[12]

Analyses of the Variation Across All Offers

Here we combine all offers from each of our three games. For our baseline model we estimated the coefficients in the following equation for each dependent variable (units are in parentheses, if applicable):

$$\begin{gathered}\text{Offer}\,(\%\text{ of stake}) = \text{Constant} + \beta_{MI} * \text{Market Integration}\,(\%) + \beta_{WR} * \text{World Religion} \\ + \beta_{I} * \text{Income}\,(\$1{,}000) + \beta_{W} * \text{Wealth}\,(\$1{,}000) + \beta_{H} * \text{Household Size}\,(\#\text{ of people}) \\ + \beta_{A} * \text{Age}\,(\text{years}) + \beta_{S} * \text{Sex} + \beta_{E} * \text{Education} + \beta_{CS} * \text{CS}\,(100\text{ people})\end{gathered}$$

To this equation we add dummy variables for cases in which the offers occur in the TPG or in the UG. The DG provides the reference game for the coefficients on these dummy variables.

Model 1 of table 4.2 is the baseline model for all offers. Market integration and world religion are the only large and significant predictors of all offers. In the models in table 4.2, we used clustered robust standard errors because the analyses compile all observations across our three experiments, which involved some repeated observations from the same individuals. We clustered on individuals to address the problem of the non-independence of repeated observations from the same person. The standard errors are below the coefficients.

TABLE 4.2 *Dictator Game, Ultimatum Game, and Third-Party Punishment Game: Linear Regressions for All Offers*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Market integration	0.131***	0.182***	0.142***	0.0839***	0.0822***	0.0695***	0.0691***
	(0.0311)	(0.0295)	(0.0307)	(0.0197)	(0.0187)	(0.0182)	(0.0182)
World religion	5.795***	−0.373	5.676***	5.573***	5.506***	6.158***	6.141***
	(2.051)	(2.216)	(1.893)	(1.864)	(1.812)	(1.819)	(1.817)
Income	0.0935	0.0952	0.0655	0.182***	0.200***	0.218***	0.227***
(U.S.$1,000)	(0.0897)	(0.112)	(0.0771)	(0.0644)	(0.0630)	(0.0610)	(0.0606)
Sex	−1.561	−1.389	−1.419	−1.118			
(Female = 1)	(1.413)	(1.384)	(1.368)	(1.279)			
Age (years)	0.0541	0.0667	0.0654	0.0659	0.0610		
	(0.0491)	(0.0466)	(0.0472)	(0.0441)	(0.0423)		
Household size	−0.259	−0.294	−0.366*	−0.183			
	(0.212)	(0.216)	(0.209)	(0.190)			
Education	0.557	0.564	0.574				
(standardized by population)	(0.663)	(0.641)	(0.637)				
Community size	−0.0647	0.0688	−0.0856				
(100 people)	(0.0897)	(0.0684)	(0.0920)				
Wealth	−0.00134	0.000670					
(U.S.$1,000)	(0.00592)	(0.00583)					
Ultimatum game	0.886	0.502	0.987	0.925	1.318	1.353	
	(1.262)	(1.260)	(1.207)	(1.105)	(1.030)	(1.009)	
Third-party punishment game	−2.828*	−4.396**	−3.117*	−4.903***	−4.098***	−4.301***	−4.953***
	(1.712)	(1.718)	(1.679)	(1.535)	(1.398)	(1.387)	(1.254)
Africa		0.194					
		(3.630)					
South America		5.740					
		(3.679)					
Oceania		11.43***					
		(4.188)					
Constant	27.22***	24.37***	27.64***	27.69***	26.03***	28.79***	29.47***
	(3.361)	(4.615)	(3.235)	(3.057)	(2.741)	(2.021)	(1.902)
Observations	840	840	887	987	1,071	1,120	1,120
Number of clusters	541	541	565	634	691	719	719
R-squared	0.086	0.119	0.092	0.080	0.076	0.068	0.067

Source: Project data.
Notes: Clustered robust standard (clustering on individuals) errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population.
$*p < 0.1$; $**p < 0.05$; $***p < 0.01$

Some might worry that, despite the global-level cultural and linguistic diversity captured in our sample of societies, the relationships observed arise from some shared history among our societies, which would create

independence problems for statistical inferences. To address this we included continental controls in model 2 using Eurasia (in which we include the United States, since it is predominantly of European cultural descent) as the reference population. Comparing models 1 and 2, the coefficient on MI increases from 0.13 to 0.18 and remains highly significant. MI is robust to continental-level controls. The coefficient on WR in model 2, however, drops dramatically to become indistinguishable from zero. This occurs because individuals with WR = 0 are scattered quite unevenly across the continents, residing mostly in Africa, and because the impact of world religion does not extend to the TPG. We explore both of these issues later.

Model 2 shows a large positive coefficient on the continental dummy variable for Oceania. This reflects our two populations in New Guinea, which tended to make high offers even after controlling for all demographic and economic differences.

To explore the robustness of our findings for market integration and world religion, we examined alternative specifications by dropping the terms with the least significant coefficients. Doing so allowed us to bring in more data, as we lacked some variables for some populations and sometimes for particular individuals. In table 4.2, models 3 to 7 show the coefficients from five different specifications. Coefficients on both MI and WR remain large and significant across models. The coefficients on MI range from 0.069 to 0.14. The coefficient on WR ranges from 5.5 to 6.16. Taken together, these coefficients indicate that moving from a fully subsistence-based society with a local religion to a fully market-integrated society with a world religion predicts an increase in offers of between thirteen and eighteen percentage points.

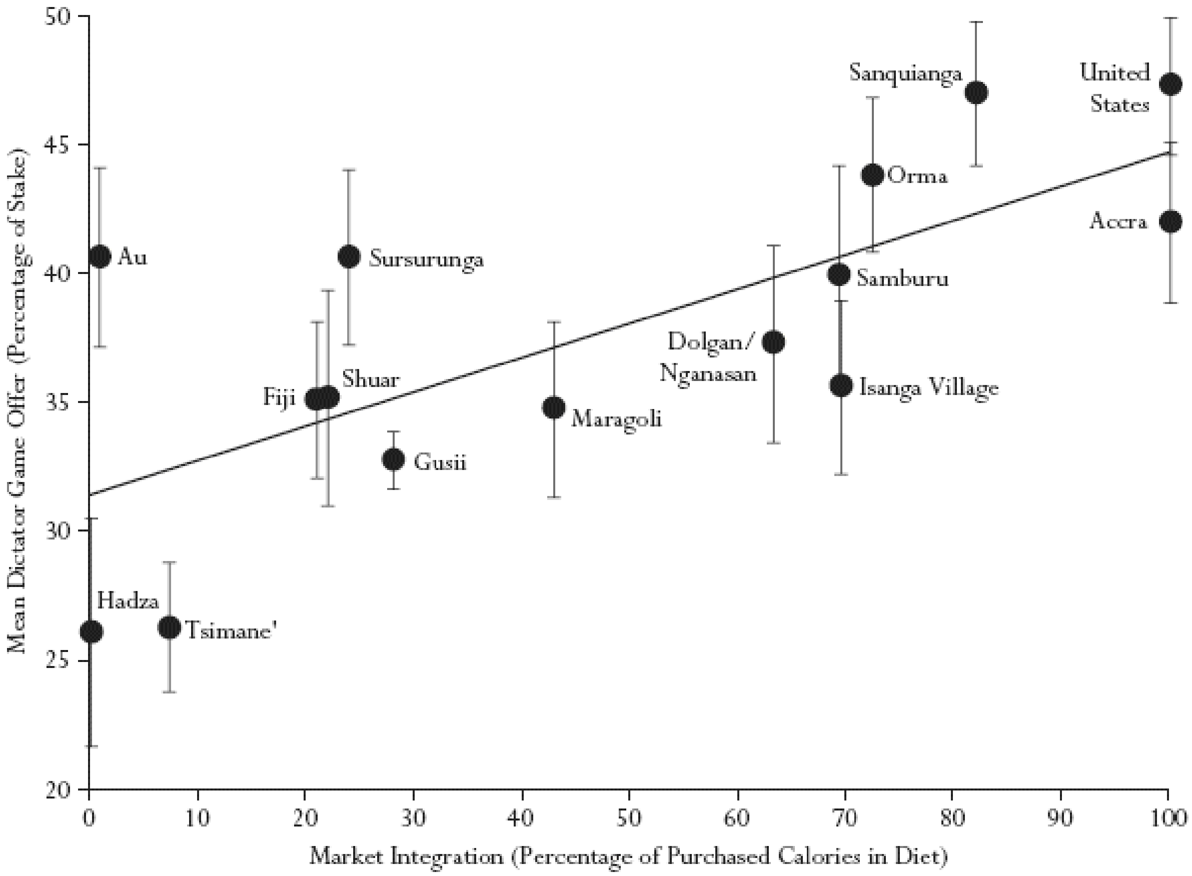
Although the coefficient on income is not significant at conventional levels in the baseline model, it is significant in models 4 to 7. Independent of MI and WR, an increase of $1,000 in income per year increases the percentage offered by between 0.18 and 0.23. As noted in chapter 3, income is mostly wage labor participation, which in itself may capture another dimension of market integration.

The TPG dummy in table 4.2 is either significant or marginally so across all seven specifications. Playing the TPG, as opposed to the DG, predicts a decrease in the percentage offered of between 2.8 and 5 percentage points. Later, we discuss this consistent drop.

While our measures of wealth, income, age, market integration, and household size are all intercorrelated, the correlations are sufficiently small that they do not create collinearity problems for our regressions. Focusing on market integration, the highest correlations in absolute values with our other predictor variables is 0.36 with community size and −0.34 for household size. World religion is the most highly correlated with MI and CS at just under 0.20. Income and wealth show by far the highest correlation at 0.55, which is one of the reasons why we reran everything with wealth dropped.

The findings related to world religion and market integration are robust to modifications in our income and wealth measures. First, in supplemental analyses that recalibrated our income and wealth measure based on local prices, the significant coefficient on MI varies little around a value of 0.13. WR's coefficient varies from about 5.8 to 6.0 and is significant across the board. No other variables in these models are even marginally significant. These findings hold when wealth, household size, and community size are dropped from the models to bring in the Gusii, Dolgan/Nganasan, and Accra samples. Similarly, in our supplementary analyses using relative wealth and income (standardized), using the same procedure of dropping the least significant predictors, both MI and WR remain large and highly significant, while no other coefficients are consistently significant.

FIGURE 4.4 *Mean Dictator Game Offers for Each Population, Plotted Against Mean Value of Market Integration*



Source: Project data.
Note: Error bars are bootstrapped standard errors (bca corrected) on the population mean.

Explaining the Variation in Dictator Game Offers

Now we proceed to analyze the offers for each of the three games separately. For the DG, we begin with a simple bivariate plot in figure 4.4 of mean MI value for each population against mean DG offers. Population mean MI values account for 52 percent of the variation in mean DG offers (ρ = 0.72, 0.4–1.0, 95 percent bootstrap CI, $P < 0.01$, N = 15). In designing this second round of our project, we sought out an additional population in New Guinea, where societies are known for this kind of gifting behavior. In our first round, the Au of New Guinea revealed highly unusual behavior, including relatively high offers with little market integration. The Au pattern replicated

in our second New Guinea population, the Sursurunga. However, because we targeted a second population that skews our world sample unrepresentatively toward New Guinea, we also examined this relationship with either the Au or the Sursurunga dropped. Dropping the Sursurunga, mean MI accounts for 58 percent of the variation ($\rho = 0.76$, 0.44–0.95, 95 percent bootstrap CI, $P < 0.001$). Dropping the Au instead, but retaining the Sursurunga, mean MI captures 71 percent of the variation ($\rho = 0.84$, 0.59–0.96, 95 percent bootstrap CI, $P < 0.001$).

Proceeding to our multivariate analyses, table 4.3 compares six regression models using the same set of predictor variables deployed in the earlier overall analysis. The baseline model, model 1, indicates that only MI and WR are large and significant or marginally significant predictors of DG offers. A comparison of models 1 and 2 in table 4.3 reveals that when both continental controls and clustered robust errors (clustering on site[13]) are included in model 2, the coefficient on MI increases from nearly 0.17 to 0.21 and remains highly significant. However, again owing to the uneven distribution across continents of WR = 0 individuals (who are mostly in Africa), the coefficient on WR drops to about 3.0 and becomes insignificant. To explore this we reran our baseline regression for only those populations in Africa. The coefficient on WR in this regression increases to above its value in our baseline regression, going from 6.4 to 6.6, though it is not well estimated owing to the smaller sample size ($p = 0.29$, N = 137, R-squared = 0.13, using robust standard errors). If we drop household size from the regression to increase the sample size, because this coefficient is both small and nonsignificant, the coefficient on WR increases to 7.9 ($p = 0.17$, N = 162, R-squared = 0.11).

TABLE 4.3 *Linear Regressions for Dictator Game Offers*

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Market integration	0.166***	0.205***	0.176***	0.161***	0.123***	0.121***
	(0.0401)	(0.0359)	(0.0364)	(0.0336)	(0.0274)	(0.0263)
World religion	6.429*	2.888	6.933**	7.671**	7.240**	7.823***
	(3.644)	(3.745)	(3.166)	(3.123)	(3.060)	(2.908)
Sex	−2.580	−2.691	−2.595	−2.829	−2.972	−3.367*
(Female = 1)	(2.203)	(3.302)	(2.047)	(1.951)	(1.841)	(1.724)
Household size	−0.114	−0.0812	−0.345	−0.396	−0.239	
	(0.312)	(0.372)	(0.293)	(0.283)	(0.269)	
Education	1.149	1.148	0.937	1.010	0.781	
(standardized by population)	(1.160)	(0.919)	(1.053)	(1.026)	(0.991)	
Income	−0.00349	−0.0534				
(U.S.$1,000)	(0.151)	(0.168)				
Age	−0.0201	−0.0133	−0.0254			
(years)	(0.0803)	(0.0690)	(0.0735)			
Community size	−0.0616	−0.0111	−0.0882	−0.0816		
(100 people)	(0.0909)	(0.0753)	(0.0924)	(0.0901)		
Wealth	0.000699	0.00127				
(U.S.$1,000)	(0.00856)	(0.00727)				
Africa		−0.899				
		(3.754)				
South America		1.548				
		(2.645)				
Oceania		6.069				
		(4.442)				
Constant	27.81***	26.89***	29.30***	29.00***	28.76***	26.81***
	(5.238)	(5.594)	(4.820)	(3.675)	(3.609)	(3.110)
Observations	311	311	336	354	384	416
R-squared	0.102	0.113	0.104	0.098	0.087	0.083

Source: Project data.
Notes: Model 2 uses clustered robust standard errors (clustering on population). Other models use robust standard errors; standard errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population.
$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Next, we check the robustness of our findings to alternative model specifications. Models 3 to 6 in table 4.3 allow us to examine what happens if we sequentially drop the least significant predictors. While both MI and WR have large coefficients in the baseline model, WR is only marginally significant at conventional levels. However, as the least significant variables are dropped and the sample size expands from 311 to 416 participants, WR becomes significant at conventional levels, with coefficients ranging from 6.9 to 7.8. MI's coefficient remains large and highly significant across all models.

Together, moving from a fully subsistence-oriented society with a traditional religion to a market-integrated economy with a world religion predicts an increase of twenty to twenty-four percentage points in DG offers, which captures the full range of variation across populations in mean DG offers.[14]

Since the effect of participating in a world religion arises from a small portion of our sample (11 percent) that is not widely distributed across our populations, we reran our baseline model using the four populations that have nontrivial frequencies of individuals with WR = 0 and for which we have data for wealth and community size. The coefficient of WR jumps from 6.4 (baseline model) to 14.8 (p = 0.002, N = 107, R-squared = 0.23, using robust standard errors). Then, to add our Accra and Siberian samples (giving us six populations), which lack wealth or community size data but do have nontrivial frequencies of those with WR = 0, we reran the same regression, dropping these variables in order to bring in data from these two populations. Now the coefficient on WR is 11.3 (p = 0.003, N = 157, R-squared = 0.18). This suggests that the WR effects are not driven by the difference between a few societies lacking a prevalent world religion.

The findings for the coefficients on MI and WR in table 4.3 are also robust to modifications in our income and wealth measures. In supplementary analyses that recalibrated income and wealth to deal with differences in local purchasing power, we found that the coefficient on MI varies little with these recalibrations, ranging from 0.16 to 0.17 (all significant across the board). WR's coefficients range from 6.0 to 6.4 and are marginally significant across the board. When we drop wealth (recalibrated) and CS out of the regression to bring additional samples, all coefficients for WR across the models with the different valuations for income are significant at conventional levels, ranging from 6.0 to 6.6. MI's coefficients are highly significant, ranging from 0.11 to 0.13. We then drop household size from the model, to bring in the Gusii sample. Here MI's coefficients range from 0.12 to 0.13 (all highly significant). WR's coefficients again range from 6.0 to 6.6 and are all significant.

We also sought to address concerns about the comparability of income and wealth across populations by estimating a series of models using standardized versions of income and wealth to obtain a purely relative measure of these variables for each population. We then repeated the procedure used in table 4.3, starting with the baseline model and dropping

the least significant variables. These supplementary analyses support the earlier finding for MI and WR, with the coefficients being as large or larger as those in table 4.3. Relative wealth here, however, also has a large and highly significant negative effect on offers, with relatively wealthier people within a given society offering less.

Since it is plausible that income and wealth may have different effects within versus between populations, we also broke both income and wealth down into population mean measures and separated within-population deviations from the population mean. The population averages allow us to assess, for example, whether individuals from populations with higher absolute incomes offer more. Within a population, measures of deviations from a local average allow us to assess whether relative income and wealth predict lower offers. For example, it is theoretically possible that individuals from populations with high mean incomes offer more, while relatively richer people (locally speaking) offer less. Our efforts found no evidence of this in the DG, however, or elsewhere. None of the coefficients on any of these wealth or income measures approached conventional levels of significance. Meanwhile, the coefficients on MI and WR do not vary much from those presented earlier. Note that because the variables *mean* wealth and *mean* income are correlated at 0.99, we never entered both into the model at the same time.

Explaining the Variation in Ultimatum Game Offers

For the UG, table 4.4 repeats the procedure used above for DG offers. Model 1, the baseline model, shows that MI, WR, and age are large, positive, and significant predictors of UG offers.

Model 2 adds continental controls to our baseline model and uses clustered robust standard errors. Here, MI increases from 0.14 in model 1 to 0.19 in model 2. WR drops dramatically, however, owing to the uneven distribution of individuals who do not participate in world religions. As a check, we reran our regression just for our African populations. Now the coefficient on WR jumps back up to 5.6 (p = 0.25, N = 112, R-squared = 0.21, using robust standard errors). We examine this more later.

Models 3 to 8 show that both MI and WR are robust, positive predictors of higher UG offers and are highly significant at conventional levels across the board. MI's coefficients range from 0.10 to 0.17, while WR's range from

7.9 to 9.8. For MI, this implies that a 20 percent increase in calories purchased in the market predicts an average increase of between 2.0 and 3.4 percentage points in the UG.

Along with MI and WR, age is also a robust positive predictor of UG offers. Each additional decade of adulthood predicts an increase of between 1.2 and 1.6 percentage points in UG offers. Since previous work has suggested a nonlinear fit for age (Bahry and Wilson 2006), we explored adding a squared term for age. We do not have evidence for this nonlinear age relationship. Unlike MI and WR, age also does not emerge as a significant predictor for offers in the DG and TPG.

Our results suggest that going from a fully subsistence economy with a traditional religion to a fully market-dependent economy with a world religion means an increase in UG offers of eighteen to twenty-six percentage points, covering most of the range of variation we observe across societies.

To further examine our findings for world religion, we reran model 1 (our baseline) using only the four populations in which individuals had nontrivial frequencies of individuals with WR = 0. The coefficient of WR is 9.1 (p = 0.032, N = 107, R-squared = 0.29, using robust standard errors). Then, to bring in Accra and the Siberian sites (giving us six populations), we reran the same regression dropping wealth and community size. Now the coefficient on WR is 7.0 (p = 0.041, N = 157, R-squared = 0.24, using robust standard errors). This indicates that the effect of world religion is not driven by differences between the few societies lacking world religions and the rest.

We also examined the robustness of our analyses using a modification of our income and wealth variables. First, paralleling our earlier efforts to address differences in local purchasing power in the DG, we used our income and wealth variables measured according to the prices of local consumables to verify that our analyses are not strongly influenced by the use of international currency exchange rates. Coefficients on MI range between 0.14 and 0.15, while WR's coefficients range from 9.96 to 10.1. All are significant, except when income and wealth are revalued using local cooking oil prices; then the p-value for MI slips to 0.056. The coefficient on age ranges from 0.14 to 0.17. In order to include the data from Accra, our Siberian site, and the Gusii, we also ran the same analyses shown earlier, first with wealth and community size dropped, and then with household size dropped. The coefficients on market integration, world religion, and age all remain large and significant across all revaluations.

TABLE 4.4 *Linear Regressions for Ultimatum Game Offers*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Market integration	0.135**	0.193***	0.132**	0.161**	0.174***	0.141***	0.142***	0.102***
	(0.0651)	(0.0520)	(0.0645)	(0.0628)	(0.0597)	(0.0315)	(0.0312)	(0.0223)
World religion	9.956***	−0.466	9.841***	8.366***	8.447***	8.693***	8.833***	7.940***
	(2.719)	(5.138)	(2.689)	(2.449)	(2.417)	(2.337)	(2.303)	(2.244)
Age (years)	0.138**	0.164*	0.143**	0.147**	0.171***	0.183***	0.163***	0.150***
	(0.0674)	(0.0896)	(0.0658)	(0.0628)	(0.0635)	(0.0617)	(0.0606)	(0.0567)
Income	0.138	0.168**	0.136	0.0798				
(U.S.$1,000)	(0.108)	(0.0579)	(0.112)	(0.0957)				
Community size	−0.256	0.0246	−0.261	−0.319	−0.327	−0.216*	−0.214*	
(100 people)	(0.222)	(0.129)	(0.221)	(0.230)	(0.233)	(0.116)	(0.115)	
Education	0.959	1.014	1.067	0.987	1.062	1.182		
(standardized by population)	(0.875)	(0.806)	(0.860)	(0.818)	(0.803)	(0.744)		
Sex	−1.362	−1.605						
(Female = 1)	(1.960)	(2.790)						
Wealth	−0.00713	−0.00402	−0.00679					
(U.S.$1,000)	(0.00824)	(0.00417)	(0.00856)					
Household size	−0.253	−0.283	−0.251	−0.299	−0.272			
	(0.271)	(0.475)	(0.269)	(0.273)	(0.276)			
Africa		−0.742						
		(3.446)						
South America		7.656*						
		(3.491)						
Oceania		19.04***						
		(5.290)						
Constant	22.90***	18.84***	22.27***	23.56***	22.21***	20.39***	20.98***	21.39***
	(3.824)	(3.818)	(3.677)	(3.657)	(3.700)	(3.193)	(3.171)	(3.119)
Observations	294	294	294	316	319	346	347	377
R-squared	0.148	0.263	0.146	0.146	0.147	0.132	0.127	0.111

Source: Project data.
Notes: Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population.
$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Then, to further address concerns about the comparability of income and wealth across populations, we estimated a series of models using standardized versions of wealth and income. We repeated the procedure of dropping nonsignificant variables, as in table 4.4. These supplemental analyses show that MI and WR have large coefficients and remain significant (usually highly significant) across all specifications. The coefficient on age also remains significant at conventional levels across specifications.

To address the possibility that income and wealth have different effects within versus between populations, we broke both income and wealth down into population mean measures and separated within-population deviations from the population mean. Analyses using these versions yield no evidence of income or wealth effects in the UG. None of the coefficients on any of these wealth or income measures approached conventional levels of significance. Meanwhile, the coefficients on MI and WR remain significant

and fairly stable. This remains true if we drop wealth, CS, and HS to bring in all of our samples.

Explaining the Variation in Third-Party Punishment Offers

For offers in the third-party punishment game, our analyses once again show the predictive importance of market integration, but in contrast to our analyses of DG and UG offers, they do not show consistent associations between offers and world religion. These analyses also find that lower incomes, greater wealth, and smaller households are all associated with higher offers (model 1 in table 4.5). We explore the disappearance of the effects for world religions and the emergence of economic variables as predictors in the TPG in the next section.

One way to address concerns about both shared culture histories and the non-independence of individuals from the same groups is to compare model 1 (baseline) with model 2 (with continental controls and clustered robust standard errors) in table 4.5. Since we lack data from the Siberian and U.S. sites for the TPG, the regression uses Africa as the reference for the continental dummies. These modifications have no quantitative effect on our main results in the TPG. The coefficients on market integration, income, wealth, and household size remain large and significant with the addition of continental controls and use of clustered robust errors. The coefficient on community size increases and becomes highly significant in model 2.

Models 3 to 6 allow comparisons of the coefficients on MI as the least significant predictors are sequentially dropped from the model. MI remains significant and meaningful. An increase of 20 percent in calories purchased in the market is associated with an increase of roughly two percentage points. For income, a $1,000 increase is associated with a *decline* of roughly 2.2 percentage points. For wealth, each $1,000 increment is associated with a roughly 1.3-percentage-point increase. For the size of players' households, an additional member is associated with approximately a one-percentage-point decline in offers.

As earlier, we also examined the robustness of our findings to modifications in our income and wealth variables. First, when we deploy income and wealth revalued using local prices of consumables, supplemental analyses show that the coefficients on MI remain large, varying from 0.08 to 0.11, and significant or marginally significant across all models, except

when salt is used to recalibrate (there p = 0.12 for MI). Wealth and household size remain significant across all six models, as does household size. Income is significant in all models except where the price of cooking oil is used to recalibrate our measures; there it is marginally significant.

Second, we also estimated a series of models using standardized versions of wealth and income. Market integration remains marginally significant across most specifications, although if only MI, income (standardized), and household size are used as predictors, MI's effects disappear. In these models, the significant effects of income (standardized), wealth (standardized), and household size also vanish. Importantly, compared to the models using either U.S. dollars or local consumable prices for wealth and income, these models explain much less of the variation in offers, with the percentage of variance explained dropping from about 10 percent to 4 percent or less. Capturing the effect of MI in the TPG would seem to depend on controlling for the actual values of income and wealth in a manner not observed in the DG and UG.

TABLE 4.5 *Linear Regressions for Third-Party Punishment Game Offers*

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Market integration	0.101**	0.100***	0.102**	0.103**	0.0987**	0.121***
	(0.0503)	(0.0171)	(0.0503)	(0.0501)	(0.0490)	(0.0427)
Wealth	1.279***	1.028***	1.286***	1.288***	1.292***	1.174***
(U.S.$1,000)	(0.262)	(0.129)	(0.258)	(0.256)	(0.253)	(0.248)
Income	−2.200**	−3.167***	−2.201**	−2.184**	−2.061**	−1.841*
(U.S.$1,000)	(0.972)	(0.666)	(0.966)	(0.950)	(0.911)	(0.947)
Household size	−1.097**	−1.030**	−1.112**	−1.115***	−1.128***	−1.006**
	(0.436)	(0.353)	(0.430)	(0.429)	(0.428)	(0.421)
Community size	0.126	0.306***	0.126	0.127	0.127	
(100 people)	(0.100)	(0.0384)	(0.101)	(0.0999)	(0.0991)	
Age	0.0529	0.0281	0.0619	0.0630	0.0631	
(years)	(0.0877)	(0.0784)	(0.0836)	(0.0834)	(0.0836)	
Sex	−1.035	−0.719	−0.913	−0.881		
(Female = 1)	(2.620)	(2.346)	(2.617)	(2.590)		
World religion	0.836	−3.672**	0.584			
	(3.027)	(1.381)	(2.954)			
Education	−0.495	−0.985				
(standardized by population)	(1.449)	(2.004)				
South America		10.48***				
		(1.633)				
Oceania		9.404***				
		(1.537)				
Constant	30.62***	28.19***	30.43***	30.78***	30.49***	33.45***
	(5.297)	(4.590)	(5.264)	(5.022)	(4.875)	(3.035)
Observations	235	235	235	235	235	242
R-squared	0.102	0.135	0.101	0.101	0.101	0.082

Source: Project data.

Notes: In the TPG, and only the TPG, we lack data on income and wealth among the Tsimane'. Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population.

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Offer Regressions Using the Minimum Acceptable Offer as a Predictor

Offers in the UG and TPG measure some combination of internalized motivations (regarding fairness, equality, relative payoffs, and so on) and beliefs about the likelihood of punishment or rejection. In the DG, there is no punishment (unless participants do not believe that the game is anonymous, a concern we discuss later), so we assume that the DG measures intrinsic motivation. To assess the degree to which the UG and TPG capture

intrinsic motivations versus fear of punishment, we reran our baseline regressions with each population's mean MinAO for the UG or TPG, as appropriate, included as an additional explanatory variable (table 4.6). The idea is that if individuals are responding to the local chances of rejection or punishment in making their offers, the mean MinAO of an individual's population should capture something of this response. A comparison of models 1 and 2 for the UG and models 3 and 4 for the TPG shows little impact on our key theoretical variables. The coefficient on MI in the UG increases from 0.14 to 0.15 with the addition of mean MinAO (in the UG) as a predictor, while in the TPG the coefficient on MI changes little. In both the UG-offer and the TPG-offer models, the coefficients on MinAO mean are positive, as expected, with more punishment predicting greater offers, though neither is significant at conventional levels. Little else changes in the analysis.

TABLE 4.6 *Linear Regressions for Offers in the Ultimatum Game and the Third-Party Punishment Game With and Without the Mean Minimum Acceptable Offer as a Predictor*

Variables	Ultimatum Game (1)	Ultimatum Game (2)	Third-Party Punishment Game (3)	Third-Party Punishment Game (4)
Market integration	0.135**	0.146*	0.101**	0.0946*
	(0.0651)	(0.0772)	(0.0503)	(0.0529)
World religion	9.956***	9.723***	0.836	0.403
	(2.719)	(2.729)	(3.027)	(3.155)
Mean MinAO UG/TPG		0.156		0.0863
		(0.159)		(0.174)
Age (years)	0.138**	0.132**	0.0529	0.0508
	(0.0674)	(0.0667)	(0.0877)	(0.0883)
Income	0.138	0.0971	−2.200**	−2.036**
(U.S.$1,000)	(0.108)	(0.124)	(0.972)	(0.954)
Community size	−0.256	−0.296	0.126	0.0960
(100 people)	(0.222)	(0.269)	(0.100)	(0.121)
Education	0.959	1.089	−0.495	−0.535
(standardized by population)	(0.875)	(0.880)	(1.449)	(1.449)
Sex	−1.362	−1.530	−1.035	−0.644
(Female = 1)	(1.960)	(1.986)	(2.620)	(2.688)
Wealth	−0.00713	−0.00917	1.279***	1.295***
(U.S.$1,000)	(0.00824)	(0.00904)	(0.262)	(0.261)
Household size	−0.253	−0.159	−1.097**	−1.097**
	(0.271)	(0.315)	(0.436)	(0.439)
Constant	22.90***	20.65***	30.62***	29.65***
	(3.824)	(4.589)	(5.297)	(5.670)
Observations	294	294	235	235
R-squared	0.148	0.153	0.102	0.103

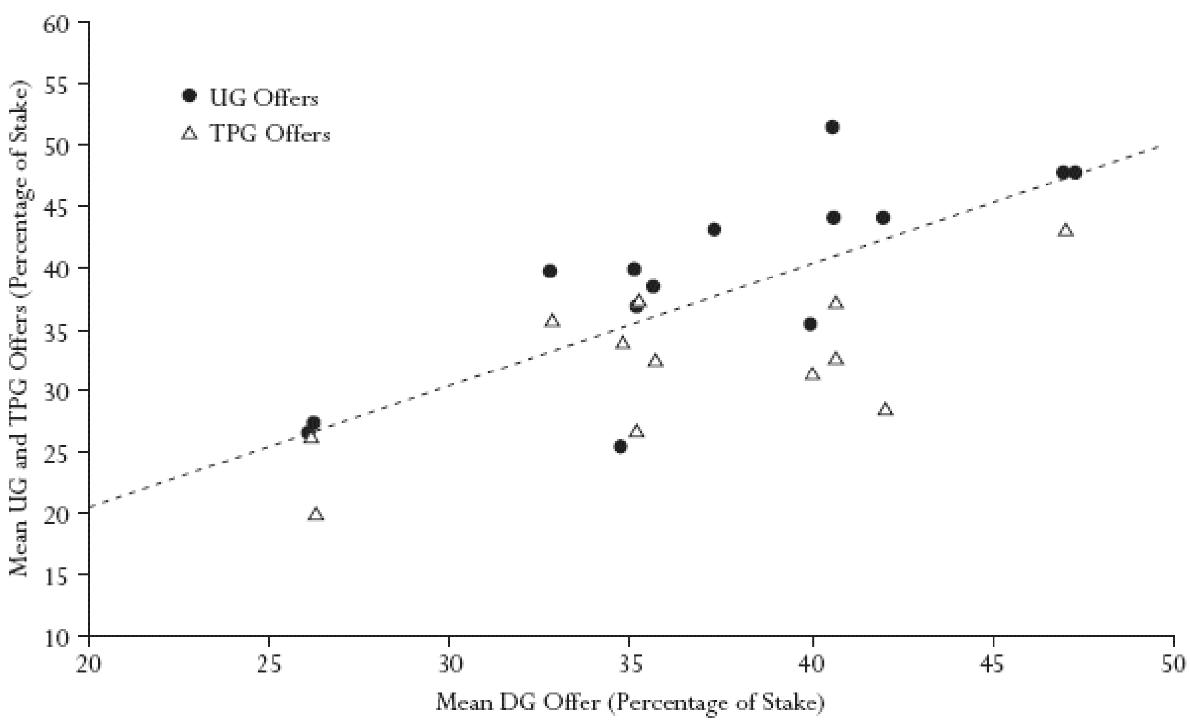
Source: Project data.
Note: Robust standard errors are in parentheses below the coefficient.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Why Does the Effect of World Religion Disappear in the Third-Party Punishment Game?

Offers in the TPG differ from offers in the DG and UG in two interesting respects. First, TPG offers are generally lower than offers in the other two games. Overall mean offers across these three games are 32 (TPG), 37 (DG), and 39 (UG) percent of the stake. Of our twelve populations that played the TPG, only three had TPG mean offers greater than their DG mean offers (greater by only 1.7 percentage points, on average), while nine had mean offers in the TPG less than in the DG (less by 6.3 percentage points on average). Both parametric and nonparametric comparisons of means show

the TPG means are lower than both the DG and UG means (all $p < 0.02$). The DG and UG mean offers, however, cannot be distinguished at conventional levels of confidence.[15] Figure 4.5 plots mean DG offers for each population along the *x*-axis and mean UG and TPG offers on the *y*-axis. The dotted line is the unity line, such that dots above indicate the UG or TPG mean is greater than the DG mean offer. This plot shows that while TPG offers tend to be lower than DG offers, UG mean offers tend to be a bit higher. Of our thirteen populations in the UG, all but two have mean UG offers greater than mean DG offers.

FIGURE 4.5 *Mean Dictator Game Offers for Each Population Plotted Against Both Their Mean Offers in the Third-Party Punishment Game and in the Ultimatum Game*



Source: Project data.

The second respect in which TPG offers differ from UG and DG offers is that while world religion is a potent predictor for the latter, it is not for the former. Moreover, while WR is not associated with TPG offers, our three indicators of material well-being—income, wealth, and household size—all are.

Here we explore one hypothesis that may help account for both of these phenomena: that is, the general drop in TPG offers (versus DG and UG offers) and the reversal in the predictive importance of WR versus the economic variables (income, wealth, and household size). We acknowledge at the outset that this is post hoc theorizing. Although our hypothesis emerges from a long-standing and well-documented empirical phenomenon termed "crowding out," which suggests that external incentives (for example, third-party punishments and rewards) can—under some circumstances—reduce other-regarding intrinsic motivations (Bowles 2008; Frey and Jegen 2004). We suspect that adding a third party who can impose fines—as in our TPG—may drive out some of people's intrinsic motivation toward equal divisions, whether those are based on altruism, inequity aversion, norm adherence, or some other motivation. This phenomenon may have manifested relatively strongly in our version of the TPG because our setup prevented third parties from punishing sufficiently to discourage purely self-interested players from offering zero.

To explore this hypothesis we reasoned that any differences between DG or UG offers and TPG offers owing to the crowding-out effect should be manifest in the relative predictive effects of world religion versus income and/or wealth (or wealth per household member). Participation in a world religion may imbue individuals with ethical principles or prosocial motivations (toward those beyond close durable relationships) that they seek to demonstrate to themselves, God, or others. World religions, through ritualized reminders, may make us judge ourselves in ways more critical, explicit, and harsh than other systems of belief. The threat of a fine might either destroy the signaling content of an individuals' generosity or diminish the intrinsic pleasure or satisfaction derived from it (or both). For example, one might take pleasure in personal altruism toward one's fellow humans or experience the pride and approval of the All Mighty by taking the time to donate blood; however, if one gets paid $10 for the blood, that good feeling and sense of divine approval may disappear, while the cash might not provide sufficient compensation for the cost in time and discomfort. With regard to our experiments, this reduction in nonpecuniary intrinsic motivations may be moderated by a player's wealth or income, which would figure into the impact of a game decision on one's material self-interest. For example, when richer individuals trade off their—now reduced—fairness motivations against their material self-interest, fairness motivations are

relatively more important (compared to those of poorer individuals) because the same amount of money has a smaller impact on the material self-interest of richer individuals (concave utility functions). Alternatively, less-well-off people may be looking for a rationalization to be less fair, and they find it once the responsibility for enforcing fairness is deflected to a third party. From this, the prediction is straightforward: populations with greater participation in world religions will show a larger difference between their DG and TPG offers once economic variables are controlled for. Greater income or wealth ought to favor smaller differences, since the decision has a smaller effect on material self-interest when values are higher.

To analyze this we had to use the population means because different players were used in the DG and TPG. We regressed the mean population differences between the DG and TPG on mean values of WR, income, and wealth (absolute and per household member). As noted previously, however, at the population aggregate level, income and wealth (and wealth per household member) are all highly intercorrelated (all > 0.9), so we paired each with WR in table 4.7 (models 1, 2, and 3). The effects of WR and each of our economic variables go in the direction predicted by our hypothesis. The coefficients on WR are large in all three models, though only significant or marginally significant when income or wealth per household member is used. The coefficients on income, wealth, and wealth per household member are all negative and large, though only the two wealth measures are significant at 0.05. To include all twelve of our data points we use income in models 4 and 5.

Model 4 adds the mean MinAO in the TPG to model 1, to control for the effects of the threat of punishment. The coefficient on WR increases, achieving conventional levels of significance. Model 5 adds MI to this, and the coefficient on WR remains significant. Societies with more participation in a world religion show larger drops in offers from the DG to the TPG. Model 5 captures 57 percent of the variation in the difference between DG and TPG mean offers.

Table 4.8 provides analyses parallel to those observed in table 4.7, now for the difference between mean UG and TPG offers. Model 1 shows that both WR and income have effects in the predicted directions, with large coefficients, though only WR's coefficient is significant at conventional levels. Adding the difference in the mean MinAOs in the UG and TPG as a predictor in model 2 to control for differences in the expectation of

punishment shows that the coefficients on both income and WR change little. Model 3 shows that adding MI to this estimation changes little, though now the coefficient on the difference in MinAO is larger and marginally significant.

TABLE 4.7 *Linear Regressions on the Difference Between Mean Dictator Game and Third-Party Punishment Game Offers*

Variables	(1)	(2)	(3)	(4)	(5)
World religion	6.350**	4.931	5.443*	7.466**	6.926**
	(2.696)	(2.992)	(2.471)	(3.064)	(2.826)
Income	−2.973			−2.462	−3.482
(U.S.$1,000)	(2.038)			(1.946)	(2.215)
Wealth		−1.135**			
(U.S.$1,000)		(0.344)			
Wealth per household member			−5.378**		
			(2.212)		
Mean MinAO TPG				−0.0987	−0.178
				(0.102)	(0.122)
Market integration					0.0927*
					(0.0450)
Constant	0.846	1.852	1.156	1.644	0.849
	(2.178)	(2.839)	(2.204)	(2.489)	(1.551)
Observations	12	11	10	12	12
R-squared	0.202	0.468	0.416	0.254	0.572

Source: Project data.
Notes: Robust standard errors are in parentheses below the coefficient. Wealth per household member is household wealth divided by household size.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

TABLE 4.8 *Linear Regressions for the Difference in Ultimatum Game and Third-Party Punishment Game Offers*

Variables	(1)	(2)	(3)
World religion	11.02***	11.88**	11.86**
	(3.237)	(3.669)	(3.668)
Income	−4.322	−4.295	−5.585
(U.S.$1,000)	(2.718)	(2.950)	(3.075)
Difference (UG MinAO − TPG MinAO)		0.100	0.255*
		(0.130)	(0.128)
Market integration			0.0864
			(0.0618)
Constant	−0.654	−0.854	−2.499
	(1.862)	(1.810)	(2.074)
Observations	12	12	12
R-squared	0.255	0.279	0.369

Source: Project data.
Note: Robust standard errors are in parentheses below the coefficient.
$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Lest the reader be concerned that this drop in offers found in moving from the DG to the TPG occurs only in the unusual contexts of our diverse small-scale societies—where, for example, antisocial punishment may occur (Henrich et al. 2006; Herrmann, Thöni, and Gächter 2008)—our protocols have also been administered to university students in the United States (see chapter 9). The undergraduate mean offers are 32 percent (DG), 39 percent (UG), and 27 percent (TPG). That undergraduates show a 5 percent drop in moving from the DG to the TPG makes them about average in our sample of societies. This suggests that alternative explanations based on antisocial punishment are not likely (Fehr, Hoff, and Kshetramade 2008; Herrmann et al. 2008).

Note that we have not included these student samples in our analyses because, unlike all our other populations, these participants are not random samples of typical communities but instead represent a narrow age range of individuals of high socioeconomic status (SES) (Emory University), most of whom are not economically self-sufficient. It is well established that student behavior in experiments like ours has not reached its adult plateau (Carpenter et al. 2005; Harbaugh et al. 2002; Sutter and Kocher 2007). Student prosociality in experiments hugs the lower bound of prosociality observed in older adults (Bellemare and Kroger 2007; Bellemare et al. 2008), and student prosociality continues to increase over the university

years (Carter and Irons 1991). Entering these samples into our database for this analysis would mix adult variation among populations with developmental variation among a sample that is also skewed socioeconomically relative to the U.S. population as a whole.

While necessarily tentative, the analysis presented in this section provides some very preliminary support for our religion-crowding-out hypothesis described earlier, as world religion and the economic variables seem to account for a nontrivial fraction of the differences between the TPG offers and offers in the other two experiments. Our small sample of twelve populations makes stronger conclusions impossible.

Why Does the Punishment Threat Fail to Reduce Offers in the Ultimatum Game?

When we performed analyses parallel to those in the previous section on the differences between DG and UG offers, nothing was ever significant at conventional levels, and the R-squared never went above 0.06. However, given our tentative results suggesting that crowding-out effects are important, we must ask why the threat of punishment present in the UG does not cue the same loss of intrinsic motivation that we observe for the TPG. We consider two possibilities and evaluate their consistency with the data.

Hypothesis 1 The strength of punishment is structurally stronger in the UG compared to the TPG. For low UG offers, punishment is cheap for player 2 and costly for player 1. For higher offers in the UG, nearing fifty-fifty, punishment becomes quite expensive for player 2, and the costs inflicted on player 1 are lower. In contrast, in our particular design of the TPG, punishing low and high offers costs exactly the same amount and the damage to player 1 is the same. Consequently, the threat of punishment in the TPG may be structurally too weak to fully compensate for the loss of intrinsic motivation created by the threat of punishment. An income-maximizer in our TPG will still give zero even when he believes that punishment is likely. (This is not the case in the UG.) This *compensatory hypothesis* suggests that the same motivational loss occurs for both the UG and the TPG, but that only the UG has sufficiently potent punishment to compensate.

We have examined the compensatory hypothesis, and it does not hold up. The above-mentioned analyses of the difference between mean DG and UG

offers find only small and nonsignificant coefficients on MinAO in the UG. Populations with greater punishment in the UG do not show greater differences in mean offers. We also substituted other statistics for the mean, including the eightieth- and ninetieth-percentile MinAO. (This is the offer that gives an 80 percent or 90 percent chance of acceptance.) These measures of the threat of punishment also showed no relationship to the difference in mean DG and UG offers. In short, the difference between DG and UG offers does not seem related to any differences in the actual threats of punishment, which are substantial. This remains true even when the mean DG offer is controlled for, thereby addressing differences in intrinsic motivation. Note, however, that we are not suggesting that the threat of punishment does not have an important influence on the decision of player 1; it is just that the difference between the TPG and the UG cannot be accounted for by this. (Detailed modeling and analysis showing how the threat of punishment can be linked to players' decisions can be found in Barr et al. 2009; see also Henrich et al. 2006).

Hypothesis 2 There may be an important psychological difference between the threat of second-party punishment, which can be motivated by revenge, and the threat of third-party punishment. Perhaps the possibility of second-party punishment is perceived as endemic to any interaction, while third-party punishment is cognitively perceived and encoded as an external source of rewards and punishments. We do not have a direct test for this hypothesis. However, our findings are broadly consistent with it in that they show the same patterns for explaining the difference between mean DG offer and mean TPG offers, and between mean UG offers and mean TPG offers.

Finally, we want to emphasize that in this section we are making a post hoc attempt to grapple with something that unexpectedly emerged from our findings. Our project was not designed to address these questions, so these unexpected patterns may be merely an artifact of our design. The DG and UG were played in rapid succession, with the same people as player 1 in both games (without feedback in between).[16] The TPG was mostly played with different participants, or alternatively, at least three weeks later in the same community, or it was played in a different community within the same population (see chapter 3). Comparing the DG and TPG raises the fewest concerns, since the DG always came first and the TPG was played much later and/or with different people (for whom it was the first game).

Nevertheless, comparisons of the difference between the DG and the UG, on the one hand, and the DG and the TPG, on the other, raise a variety of methodological concerns that cannot be adequately addressed given our design. Overall, we think the only conclusion this analysis strongly favors is the need for further investigation.

Punishment in the Third-Party Punishment and Ultimatum Games

Our analyses of rejections in the UG and fining in the TPG indicate that people from larger communities engage in more costly punishment. As laid out in chapter 2, theoretical work examining various mechanisms capable of sustaining costly norms, including those associated with fairness among strangers, suggests that smaller groups can sustain costly norms with reputational systems that, for example, allow individuals to withdraw help from norm-violators instead of punishing them at a personal cost (Panchanathan and Boyd 2004). Larger cooperative groups require costly punishment because reputational systems rapidly break down as group size increases (Panchanathan and Boyd 2003). At the same time as reputational systems are collapsing, the anonymity of larger groups mitigates the threat of counterpunishment—punishing someone back who punished you—thereby increasing the range of conditions in which costly punishment can sustain larger-scale cooperation and prosocial norms. That is, the possibility of counterpunishment threatens the effectiveness of punishment in maintaining cooperation in smaller groups. This problem declines in larger populations because anonymity increases, so “pushing back” is more costly or difficult. This line of theory predicts that larger coherent communities must have diffuse punishment—otherwise, they would break down and not remain large communities for long. Since some theoretical work suggests that reputational breakdown should be roughly proportional to the natural logarithm of the group size (Cancho et al. 2004), here we use both community size and the natural logarithm of community size (LNCS) as key theoretical predictors of variables. We also discuss the use of the square of community size.

As described earlier, we reduced our vectors of punishment decisions in both the TPG and the UG to a single number called a minimum acceptable offer (MinAO) for each person. This is the lowest offer below 50 for which

an individual would not reject (in the UG) or pay to punish (in the TPG). To analyze the MinAOs in both the UG and the TPG, we used an ordered logistic regression (OLR) instead of an OLS regression because our dependent variables (MinAOs) are both discrete and bimodally distributed. The diagnostics for our initial linear regressions indicated that basic assumptions were being dramatically violated. The OLR assumes that the dependent variables are discrete and rank-ordered, but that the distance between discrete ranks is not meaningful.[17]

All coefficients shown and discussed here are reported as odds ratios, for ease of interpretation.

Minimum Acceptable Offers in the Third-Party Punishment Game

The third-party punishment game provides the most straightforward measure of an individual's willingness to engage in diffuse, norm-enforcing, costly punishment because, unlike the ultimatum game, the motivation behind this punishment cannot be simply revenge for a direct personal slight. Model 1 in both table 4.9 and table 4.10 shows that CS and LNCS (natural logarithm of community size) are large and significant predictors of MinAOs in the TPG. Comparing model 1 (baseline) and model 2 in table 4.9 shows that adding both continental controls and using clustered robust standard errors results in little change to our findings. Models 3 through 9 test the robustness of community size as a predictor, following the same procedure. The odds ratio (standing in for the coefficient) tells us how much an increase of one hundred people in community size influences an individual's chances of punishing in the next-higher MinAO category (for example, the increased chance of delivering an MinAO of 20 percent instead of 10 percent). The coefficient on CS remains large and highly significant across all specifications. Figure 4.6 graphically illustrates the effect size of CS. Figure 4.7 graphically presents the estimated association between LNCS and the TPG MinAO.

The reader should note that the coefficient on WR is positive and significant, or marginally so, across all these specifications. Participating in a world religion predicts more punishment in the TPG. We think this is worth noting, but do not make much of it, because if we use the LNCS (table 4.10), the WR effect evaporates.

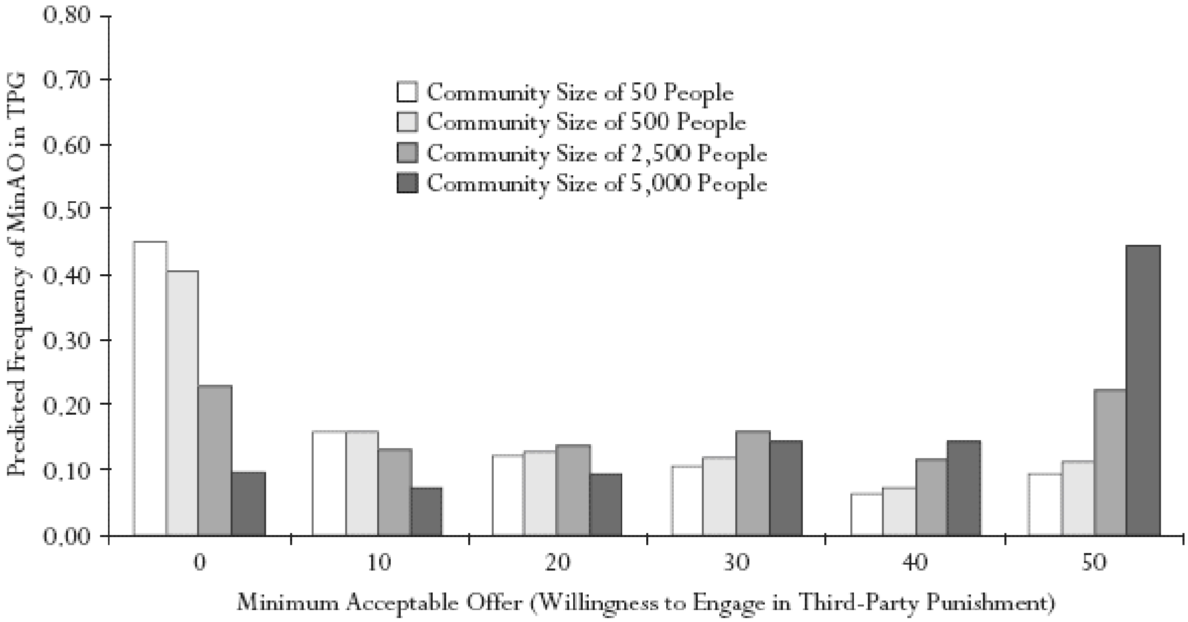
Table 4.10 parallels the analysis in table 4.9, now using LNCS in place of CS. Comparing models 1 and 2 shows that the odds ratio for the coefficient of LNCS increases from 2.4 to 2.7 and remains highly significant when phylogenetic controls for shared culture history are added and clustered robust standard errors are used. Little else changes in this specification. If anything, adding continental-level controls increases the effects of LNCS. In contrast to the results shown for CS, these models also indicate that MI has a negative effect on MinAO (that is, an odds ratio less than one). This indicates that more market-integrated societies punish less.[18]

TABLE 4.9 *Ordered Logistic Regressions for the Minimum Acceptable Offer in the Third-Party Punishment Game, Using Community Size*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Community size	1.042***	1.044***	1.041***	1.050***	1.050***	1.050***	1.055***	1.054***	1.056***
(100 people)	(0.0108)	(0.0143)	(0.0103)	(0.00802)	(0.00806)	(0.00806)	(0.00731)	(0.00731)	(0.00724)
World religion	2.055**	2.312**	2.267**	2.348**	2.346**	2.288**	1.772*	1.772*	
	(0.701)	(0.925)	(0.745)	(0.800)	(0.798)	(0.757)	(0.547)	(0.538)	
Sex	0.611*	0.603	0.647*	0.659*	0.663*	0.679*	0.761		
(Female = 1)	(0.170)	(0.224)	(0.166)	(0.156)	(0.159)	(0.159)	(0.167)		
Wealth	0.981	0.976	0.972	0.976	0.975	0.972			
(U.S.$1,000)	(0.0479)	(0.0468)	(0.0462)	(0.0446)	(0.0434)	(0.0411)			
Market integration	1.007	1.003	1.003	1.001					
	(0.00615)	(0.00754)	(0.00541)	(0.00476)					
Income	0.938	0.911	0.949	0.964	0.968				
(U.S.$1,000)	(0.0885)	(0.105)	(0.0893)	(0.0932)	(0.0933)				
Household size	0.995	0.999	0.995						
	(0.0400)	(0.0446)	(0.0364)						
Age	0.999	0.997							
(years)	(0.0113)	(0.0140)							
Education	0.959	0.938	0.885	0.894	0.892	0.888			
(standardized by population)	(0.139)	(0.129)	(0.116)	(0.108)	(0.107)	(0.105)			
South America		1.417							
		(0.599)							
Oceania		0.823							
		(0.579)							
Observations	197	197	211	242	242	243	268	268	269
Pseudo-R-squared	0.0562	0.0580	0.0479	0.0734	0.0734	0.0733	0.0776	0.0759	0.0725

Source: Project data.
Notes: Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficients. Education has been standardized to a mean of zero and standard deviation of one within each population. Coefficients are reported as odds ratios.
$*p < 0.1$; $**p < 0.05$; $***p < 0.01$

FIGURE 4.6 *Community Size Predicting Third-Party Punishment Game Minimum Acceptable Offers*



Source: Project data.
Note: The coefficients used to create the plots are from an ordered logistic regression containing the eight other variables.

FIGURE 4.7 *LNCS Predicting Third-Party Punishment Game Minimum Acceptable Offers*

Source: Project data.

Note: The coefficients used to create the plots are from an ordered logistic regression containing the eight other variables.

TABLE 4.10 *Ordered Logistic Regressions for the Minimum Acceptable Offer in the Third-Party Punishment Game, Using LNCS*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LNCS	2.479***	2.746***	2.583***	2.249***	2.283***	2.270***	2.256***
	(0.416)	(0.743)	(0.425)	(0.219)	(0.217)	(0.213)	(0.208)
Market integration	0.981**	0.972*	0.978***	0.988**	0.988**	0.987**	0.989**
	(0.00883)	(0.0141)	(0.00810)	(0.00542)	(0.00522)	(0.00522)	(0.00514)
Household size	0.989	0.991	0.980				
	(0.0398)	(0.0430)	(0.0359)				
Sex	0.641	0.625	0.658	0.693	0.692		
(Female = 1)	(0.180)	(0.228)	(0.172)	(0.155)	(0.155)		
World religion	1.328	1.413	1.305	1.203			
	(0.472)	(0.547)	(0.442)	(0.429)			
Income	0.964	0.905	0.956				
(U.S. $1,000)	(0.0942)	(0.114)	(0.0873)				
Wealth	0.987	0.977					
(U.S. $1,000)	(0.0482)	(0.0345)					
Age	0.999	0.995					
(years)	(0.0114)	(0.0132)					
Education	0.960	0.929	0.916	0.806*	0.810*	0.829	
(standardized by population)	(0.135)	(0.136)	(0.120)	(0.0933)	(0.0940)	(0.0959)	
Africa		0.469*					
		(0.213)					
Oceania		0.422**					
		(0.151)					
Observations	197	197	212	267	267	267	269
Pseudo-R-squared	0.0868	0.0923	0.0840	0.0955	0.0952	0.0923	0.0900

Source: Project data.
Notes: Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficients. Education has been standardized to a mean of zero and standard deviation of one within each population. Coefficients are reported as odds ratios.
$*p < 0.1$; $**p < 0.05$; $***p < 0.01$

We also tried using combinations of CS, CS-squared, and LNCS. The goodness-of-fit measures are somewhat better for the LNCS vis-à-vis CS and CS-squared (together), as we would expect from theory. When CS is entered along with CS-squared, both are significant. The effect of CS is large and positive (or odds ratio > 1) and the effect of CS-squared is smaller and negative, suggesting a declining effect of CS as populations get large. Goodness-of-fit measures (both pseudo-R-squared and AIC [Akaike information criterion]), however, still indicate that entering LNCS alone is superior to entering both CS and CS-squared.

As we did earlier for offers, we tested the robustness of these results to modifications in our income and wealth variables. First, we ran separate models for CS and LNCS with our wealth and income revalued by local prices in batteries, rice, sugar, cooking oil, and salt. We found no qualitative differences from tables 4.9 and 4.10. When CS is used, its coefficient hovers close to 1.04. When LNCS is used, its coefficient hovers close to an odds ratio of 2.48. Second, we also explored the effects of standardizing our income and wealth variables. When CS is used, its coefficient varies from an

odds ratio of 1.04 to 1.05. When LNCS is used, its coefficient varies from an odds ratio of 2.47 to 2.56. All coefficients on CS and LNCS in these checks are highly significant at conventional levels across the board.

In our sample, local community sizes are highly correlated with overall ethnic group size. In a few cases, the boundaries of the ethnic group are somewhat unclear, so several different demarcations could be drawn, making it somewhat difficult to nail down a precise value for this relationship. However, using a sensible set of demarcations, we have estimated the correlation at 0.97 (Marlowe et al. 2008). This relationship makes good sense from our theoretical perspective: those populations with more third-party punishment can stabilize more fairness and cooperation in larger populations, leading to larger, more stable ethnic groups and success in competition with other ethnic groups (Kelly 1985; Sahlins 1961). Since we get similar findings whether we use ethnic group size or local community size, these analyses cannot tease out which is the best predictor. From our theoretical perspective, these are causally interconnected in any case. Such findings are consistent with recent work suggesting that cultural group selection, driven by differences in political complexity, can help explain the size and diversity of languages globally (Currie and Mace 2009).

Minimum Acceptable Offers in the Ultimatum Game

Willingness to engage in second-party punishment, as measured by rejecting in the ultimatum game, is also positively related to both CS and LNCS. Model 1 in tables 4.11 and 4.12 shows our baseline models. As with the MinAO in the TPG, the coefficients on both LNCS and CS are large and highly significant. Individuals from larger communities tend to punish more. The coefficient on MI is also a potent predictor in both tables 4.11 and 4.12, as it is in table 4.10. Figures 4.8 and 4.9 illustrate the magnitude of these coefficients. The coefficient on MI indicates that, ceteris paribus, individuals from more market-integrated communities punish less. In contrast to the analysis of the TPG MinAO here, income and household size are also significant at conventional levels in some models, with higher-income individuals generally punishing more and those from larger households punishing less.

TABLE 4.11 *Ordered Logistic Regressions for the Minimum Acceptable Offer in the Ultimatum Game, Using Community Size*

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Community size (100 people)	1.077***	1.116***	1.076***	1.075***	1.076***	1.061***	
	(0.0142)	(0.0149)	(0.0133)	(0.0135)	(0.0136)	(0.0131)	
Market integration	0.979***	0.963***	0.979***	0.979***	0.980***	0.985***	0.998
	(0.00566)	(0.00733)	(0.00544)	(0.00549)	(0.00529)	(0.00479)	(0.00295)
Household size	0.924**	0.981	0.924**	0.929**	0.925**	0.921***	0.956*
	(0.0294)	(0.0267)	(0.0294)	(0.0288)	(0.0286)	(0.0274)	(0.0251)
Income	1.054***	0.968***	1.054***	1.055***	1.056***	1.038***	1.031**
(U.S.$1,000)	(0.0181)	(0.00959)	(0.0177)	(0.0177)	(0.0175)	(0.0140)	(0.0125)
Wealth	0.998	0.998***	0.998	0.998	0.998		
(U.S.$1,000)	(0.00216)	(0.000395)	(0.00215)	(0.00216)	(0.00215)		
Age	1.006	1.004	1.007	1.007			
(years)	(0.00941)	(0.0130)	(0.00887)	(0.00882)			
World religion	1.143	0.843	1.138				
	(0.340)	(0.214)	(0.327)				
Sex	0.993	1.034					
(Female = 1)	(0.239)	(0.252)					
Education	0.972	1.031					
(standardized by population)	(0.130)	(0.155)					
Africa		0.0186***					
		(0.0117)					
South America		0.0134***					
		(4.13e-07)					
Oceania		0.0340***					
		(0.0401)					
Observations	272	272	272	273	293	324	354
Pseudo-R-squared	0.0315	0.0743	0.0314	0.0310	0.0289	0.0221	0.00744

Source: Project data.

Notes: Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population. Coefficients are reported as odds ratios.

$^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

TABLE 4.12 *Ordered Logistic Regressions for the Minimum Acceptable Offer in the Ultimatum Game, Using LNCS*

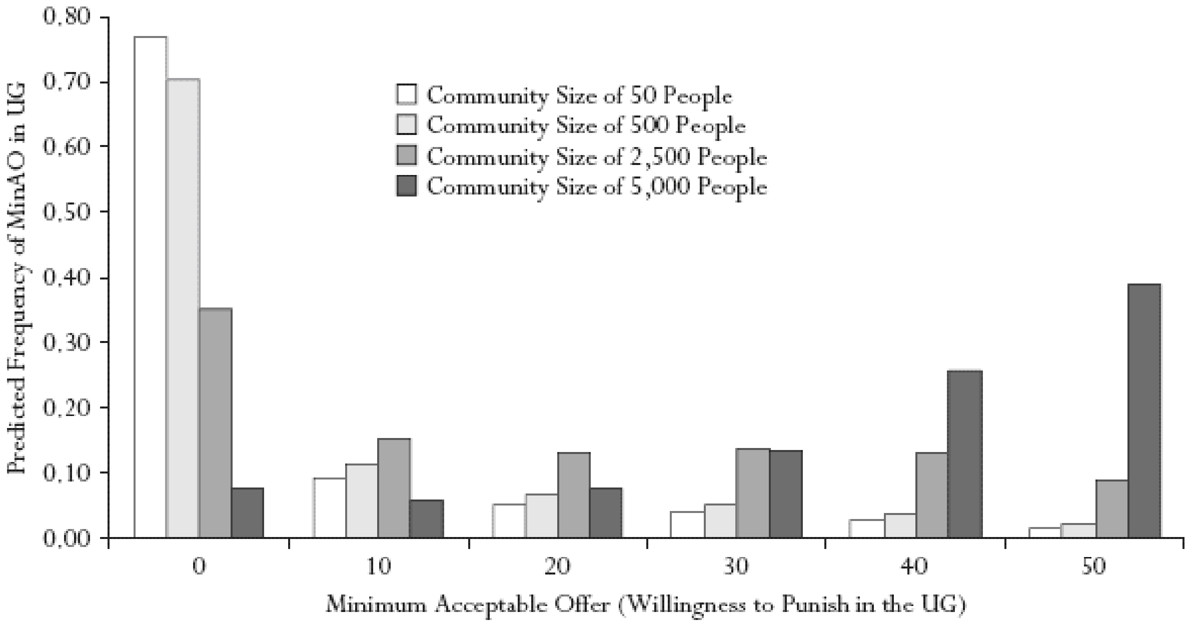
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LNCS	1.856***	3.116***	1.858***	1.759***	1.684***	1.599***	1.764***
	(0.294)	(0.946)	(0.288)	(0.267)	(0.241)	(0.207)	(0.161)
Market integration	0.974***	0.947***	0.974***	0.978***	0.979***	0.981***	0.976***
	(0.00781)	(0.0163)	(0.00758)	(0.00705)	(0.00686)	(0.00625)	(0.00504)
Household size	0.925**	0.986	0.924**	0.926**	0.923**	0.919***	
	(0.0297)	(0.0243)	(0.0297)	(0.0291)	(0.0289)	(0.0279)	
Income	1.058***	0.971***	1.058***	1.056***	1.054***	1.040***	1.055***
(U.S. $1,000)	(0.0194)	(0.00962)	(0.0190)	(0.0182)	(0.0175)	(0.0142)	(0.0158)
Wealth	0.998	0.998***	0.998	0.998	0.998		
(U.S. $1,000)	(0.00216)	(0.000326)	(0.00215)	(0.00212)	(0.00212)		
Age	1.007	1.003	1.007				
(years)	(0.00949)	(0.0127)	(0.00892)				
Education	0.998	1.066					
(standardized by population)	(0.132)	(0.162)					
World religion	0.741	0.355***	0.738	0.744			
	(0.244)	(0.0903)	(0.234)	(0.237)			
Sex	0.986	1.079					
(Female = 1)	(0.235)	(0.260)					
Africa		0.0116***					
		(0.0119)					
South America		0.00657***					
		(0.00995)					
Oceania		0.0265***					
		(0.0356)					
Observations	272	272	272	292	293	324	356
Pseudo-R-squared	0.0299	0.0832	0.0299	0.0258	0.0248	0.0207	0.0343

Source: Project data.

Notes: Coefficients are reported as odds ratios. Model 2 uses clustered robust standard errors (clustering on site); other models use robust standard errors; standard errors are in parentheses below the coefficient. Education has been standardized to a mean of zero and standard deviation of one within each population.

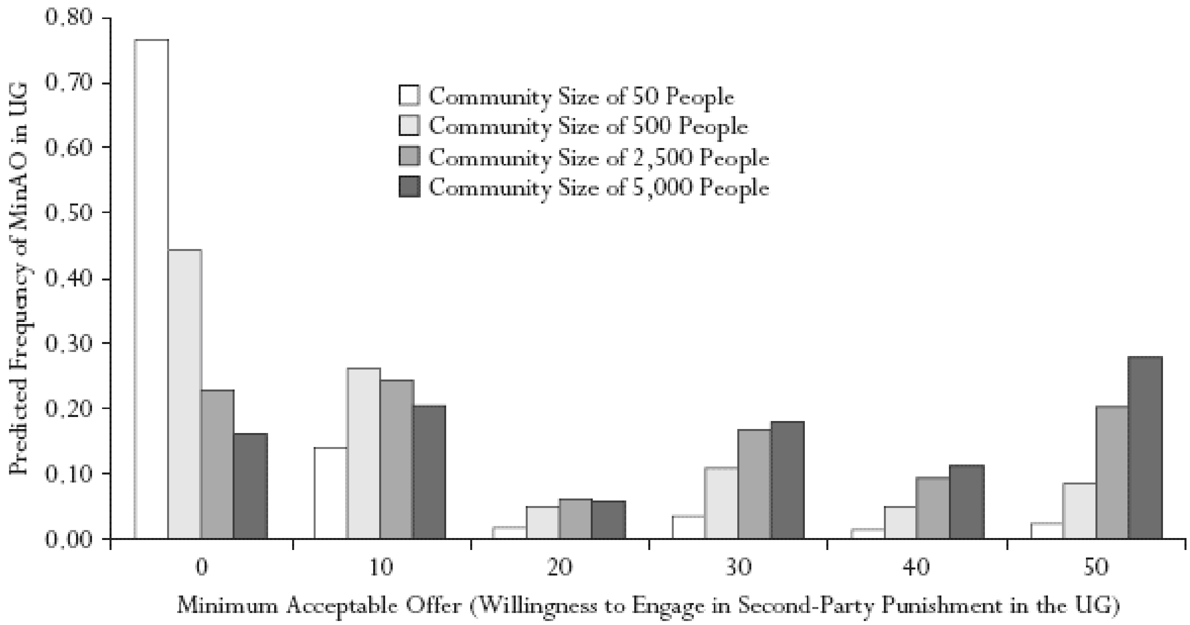
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

FIGURE 4.8 *Community Size Predicting Ultimatum Game Minimum Acceptable Offers*



Source: Project data.
Note: The coefficients used to create the plots are from an ordered logistic regression containing the eight other variables.

FIGURE 4.9 *LNCS Predicting Ultimatum Game Minimum Acceptable Offers*



Source: Project data.
Note: The coefficients used to create the plots are from an ordered logistic regression containing the eight other variables.

To check for the effects of cultural phylogeny and the use of clustered robust standard errors, compare models 1 and 2. When continental controls are added and clustered robust errors are used, the odds ratio for both CS (table 4.11) and LNCS (table 4.12) increases (a larger effect) and remains highly significant. The odds ratio for MI also withstands these checks in both tables. In contrast, the odds ratio for income drops below one, indicating a change in direction, while the odds ratio for wealth becomes significant because its standard error shrinks. For household size, the odds ratio increases toward one and becomes nonsignificant.

Models 3 to 7 in tables 4.11 and 4.12 examine the effect of alternative specifications for CS and LNCS. The odds ratios for both CS and LNCS remain large and highly significant across these models. To aid interpretation, the estimated association between CS (when LNCS is used) and the UG MinAO is presented graphically in figure 4.8. The effects of MI and household size are also robust across these specifications.

We also explored how dropping CS or LNCS, respectively, from these models influences what happens to the coefficients on market integration,

income, and household size. The result is that the odds ratios for both MI and HS move toward one and become nonsignificant. The odds ratio for income also moves toward one, but remains significant. These analyses show that the significant negative relationship for MI and HS depends on keeping CS or LNCS in the regression (and only on this). In contrast, if CS or LNCS is the only predictor in the model, both remain highly significant, though the odds ratio for their coefficients does decrease.

Here, too, we checked the robustness of these findings by using modifications of our income and wealth control variables. First, in models replacing these variables with income and wealth variables derived from the prices of local consumables at the site, we found no qualitative differences from the results in tables 4.11 and 4.12. When CS is used, its coefficient varies from an odds ratio of 1.07 to 1.11. When LNCS is used, its coefficient varies from an odds ratio of 1.75 to 2.55. Second, we also explored the effects of standardizing our income and wealth variables. When CS is used, its coefficient varies from an odds ratio of 1.05 to 1.06. When LNCS is used, its coefficient varies from an odds ratio of 1.54 to 1.57. Again, these results vary little from what has already been observed, except that in these analyses income is not an important predictor of MinAO. All coefficients on CS and LNCS are highly significant across the board in both of these robustness checks.

Overall, both CS and LNCS are robust and potent predictors of MinAO in both the third-party punishment and ultimatum games. Larger communities punish more, controlling for our eight other variables. Both measures of pseudo-R-squared and AIC indicate that the LNCS size fits better than CS alone. Market integration predicts less punishment in most of our analyses, though never when CS is used to predict MinAO in the TPG. MI's effect requires that CS or LNCS be in the equation. If CS or LNCS is dropped, MI's effect dramatically decreases or reverses direction. Household size and wealth sometimes emerge as important predictors of the MinAO in the UG. The direction of the effect is such that more wealth or bigger households lead to lower MinAOs in the UG. Income also generally shows significant effects for the MinAO in the UG, with more income predicting more punishment (though income predicts less punishment when continental controls are included).

DISCUSSION

Here we review each of our major findings and consider its implications. Then we discuss our theoretical interpretations and consider alternative views of our findings. We close by addressing common concerns about the interpretation of experimental findings. Taking our four major findings in turn, we summarize and interpret each set of results and then consider its implications for understanding human sociality and the emergence of prosocial norms and institutions.

Summary of Major Findings

1. Fairness and Punishment Show Both Substantial Variability and Reliable Patterns Across Diverse Populations Replicating and extending our previous work with the ultimatum game (Henrich,…and Gintis 2004), we find substantially more variability across our diverse samples than is typically observed among people from industrialized societies. In all three experiments, mean offers and the standard deviations in offers vary substantially across our populations, especially when compared to the variation observed in subject populations from Western industrialized societies. With regard to people's willingness to engage in costly punishment, we found variation across populations not only in their willingness to punish *low* offers but also in their willingness to punish UG offers that were "too large." This phenomenon of hyper-fair rejections confirms initial observations made of the Au and Gnau data in our previous project (Tracer 2003, 2004) and is consistent with subsequent work in other societies (Bellemare et al. 2008; Güth et al. 2003; Wallace et al. 2007), including work done in Russia and China (Bahry and Wilson 2006; Hennig-Schmidt et al. 2008). Although not visible in the UG among typical undergraduate participants in the United States and Europe, such behavior has been detected using bargaining games that permit more finely tuned punishment (Andreoni et al. 2003; Huck 1999).

The behavioral variation captured in our data has important implications. We think much of the variation across populations captures the presence of social norms, but whatever one's preferred theory of human social behavior, the observed variability must be explained. However, despite our previous efforts (Henrich et al. 2005a), much work in economics and psychology (see, for example, Sanfey 2007) continues to proceed as if the results from students are generalizable to the species. To the contrary, our experiments

show that Westerners consistently occupy the extreme ends of the behavioral distributions, just as they do in many other aspects of psychology (Henrich, Heine, and Norenzayan 2010). This variability suggests that Western students—and people from industrialized societies more generally—should not be used to make inferences about "human behavior" or social motivations.[19]

Alongside this variation, however, are also quite robust patterns across populations. In all populations, the probability of second- or third-party punishment (in the UG and TPG, respectively) declines as offers increase from zero to half of the total stake. Offers of 50 percent were always the most acceptable offer, although fifty-fifty offers often tied with other offers. Mean and modal offers across societies ranged across all three experiments from 10 percent to 50 percent, with very few offers above 50 percent. Such robust patterns, while they may seem broad, dramatically reduce the state space of possible explanatory theories.

Some social scientists have often suggested that cultural variability is so immense that essentially anything goes—that people are infinitely malleable (Pinker 2002). This is not consistent with our findings, especially when the additional populations from our previous project are added (giving us twenty-four different populations). Along these lines, it is important to consider what we did *not* observe at the population level. First, we did not observe nonmonotonic changes in the likelihood of punishment for offers from 0 percent to 50 percent, or from 50 percent to 100 percent; that is, people from a particular society did not punish offers of 20 percent a lot, offers of 30 percent a little, and offers of 40 percent a lot. Second, no population had mean or modal offers above 60 percent. Mean offers for immensely different populations in all three games occupy only about one-quarter of the possible spectrum, replicating our findings in phase 1. It is not the case that "anything goes" cross-culturally.

Although broad patterns do exist across our populations, predictions based on the assumption of narrow economic self-interest (money maximization) fail in all populations studied and in all three experiments. Participants either engage in significant amounts of costly punishment, despite the one-shot nature of the experiments, or give too much, given the likelihood of punishment. This remains true even if standard versions of risk aversion are considered. Most importantly, this model fails *in different ways in different places*, suggesting that behavioral models of decisionmaking

rooted in empirical work from industrialized societies are rather limited in their generalizability.

This conclusion should not be taken as an indictment of game theory in general, or of the use of utility models (Henrich et al. 2005b). We enthusiastically support the use of game theory, both evolutionary and classical versions, and many models already exist that broaden narrow assumptions (Bolton and Ockenfels 1999; Charness and Rabin 2002; Fehr and Schmidt 1999). For example, our team has developed a one-parameter model based on inequity aversion that, once calibrated to each population, performs remarkably well in explaining the broad patterns observed (Barr et al. 2009). Thus, the problem highlighted here is not so much with the common assumption of purely self-regarding motivations, but with a failure to endogenize preferences in a manner that recognizes the effects of social norms and institutions on the internalization of motivations and formation of beliefs (Bowles 1998).

2. Fairness Increases with Market Integration Data from all three games demonstrate that fairness (making more equal offers) in transactions with anonymous partners is robustly correlated with increasing market integration.

For UG offers, this finding largely replicates the findings from phase 1 of the project (Henrich et al. 2005a). The DG findings represent a substantial extension of this finding, since offer decisions in the DG do not face any threat of punishment. These DG results combined with our analyses of the UG and TPG offers controlling for the local mean MinAO (threat of punishment) support the idea that this variation is at least partially rooted in internalized motivations.

3. Fairness Increases with an Individual's Participation in a World Religion In the DG and UG, participation in a world religion (versus a local traditional religion) is associated with a six- to ten-percentage-point increase in offers, controlling for other economic and demographic variables, including market integration. However, we should be less confident in the WR finding, both because of the rather small proportion of our sample with WR = 0 and because of weaknesses that emerge in some of the robustness checks, though the WR findings hold up quite well in the face of many of the additional analyses. Also, for world religion, our data include only Islam and

Christianity (in a variety of forms), so we do not know if our conclusions would hold up for other widely subscribed supernatural belief systems like Judaism, Buddhism, and Hinduism.[20] We did not find a significant effect of WR on TPG offers, though as we conjectured earlier, the threat of weak third-party punishment may have crowded out prosocial motivations among adherents to world religions, which may also explain why mean offers drop in the TPG relative to the DG and UG.

Together, our findings for MI and WR show that moving from a fully subsistence-based population participating in a traditional religion to a market-based economy with a world religion predicts an increase in offers of roughly twenty points, thus explaining most of the difference we observe in offers across populations. As we emphasize later, this means that whatever theory one deploys to explain the variation we observe, it needs to account for the strong relationship of fairness with market integration and world religions. Our evolutionary approach to norms and institutions provides one hypothesis for this linkage.

4. Willingness to Engage in Costly Punishment Increases with Community Size People from larger communities punish more. This effect emerges in both of our measures of second-and third-party punishment and is robust to the inclusion of demographic and economic control variables, including market integration. The predicted mode for MinAO, our measure of willingness to punish, shifts from 0 percent in populations of 50 to 500 to 50 percent in populations of 5,000 (see figures 4.6 to 4.9). These findings dramatically extend Frank Marlowe's (2004) initial insights derived from work among Hadza foragers, as well as broader analyses of settlement size from phase 1 (Henrich,…and Gintis 2004). Whatever one's preferred theory about the variation in punishment, it should explain why punishment varies with community size.

In addition to the relationship between CS and MinAO, two other relationships are worth highlighting here as well. First, greater punishment in the TPG predicts not only TPG offers but mean offers in the UG and DG (Henrich et al. 2006). Second, larger communities with greater punishment and fairness (for example, in the DG) are strongly associated with larger ethnic groups. Although only correlational, these observations are consistent with the idea that groups with more stable prosocial norms can spread at the expense of groups with less prosocial norms, or that groups with norms

stabilized by costly punishment (as opposed to other reputation-based mechanisms) can expand and sustain an ethnic identity more readily than groups lacking these kinds of norms. Both of these interpretations are consistent with the theoretical picture developed in chapter 2: norms can spread as a consequence of their group-beneficial effects.

Finally, it is worth noting that despite the fact that we studied multiple communities within many of our two dozen sites and conducted extensive analyses over two phases of our project, no robust individual-level demographic or economic predictors emerged in their data to account for variation within sites. On this count, other researchers have made much of a few correlations that emerge after testing dozens of predictor variables (Lamba and Mace 2011, 2013), which generally turn out to be inconsistent across games and not robust across societies (Henrich et al. 2012). Our strategy is to focus on only the most robust and theoretically well-grounded aspects of our overall findings.

Theoretical Interpretations

Here we consider several different theoretical interpretations of our findings. We begin by briefly recounting the theoretical interpretation presented at length in chapter 2, which we label the *social norms for complex, market-integrated societies hypothesis*. Then we deal with three versions of what we call the *anonymity hypotheses*. Finally, we consider the *genetic differences hypothesis*, which explores whether recent work in behavioral genetics using experimental tools like the UG and DG suggests that the variation we observe arises from genetic differences among populations.

In presenting and clarifying these interpretations, it is important to distinguish motivations (or preferences) from beliefs. *Motivations* are the internalized states or the anticipation of such states—such as goals, wants, drives, desires, or preferences—that aggregate to propel behavior. *Beliefs* are mental representations or expectations about the state of the world or the likelihood of various future states. Beliefs map actions onto outcomes. Motivations and beliefs can be context-dependent, culturally transmittable, and non-independent (linked). To give a simple example, suppose John likes pizza but really wants to live a long time (he is motivated to eat pizza and to have a long life). However, because he believes that pizza is bad for his longevity (a belief about pizza-eating), he tries not to eat very much pizza. If

John comes to believe pizza is actually good for his longevity, he will eat much more pizza. Theories of human behavior need not make this distinction, but since at least some of the theories dealt with here do make it, we need to keep this in mind.[21]

Social Norms for Complex, Market-Integrated Societies In chapter 2 we argue that understanding human social behavior and psychology requires recognizing both (1) that humans acquire, as a consequence of growing up in particular places, interrelated sets of beliefs, expectations, and internalized motivations, and (2) that competition among social groups, religions, and institutions has sculpted these group-beneficial social norms over the course of cultural evolution (Chudek and Henrich 2010). This recognition allows us to begin to construct an understanding of the formation of large-scale cooperative societies in which strangers, or those not engaged in long-term, durable relationships, can increasingly engage in reliable, mutually beneficial transactions and cooperative enterprises. Since the origins of agriculture, large and complex societies are likely to have prospered and spread to the degree that their norms and institutions effectively sustain successful interaction in ever-widening socioeconomic spheres.

Norms that enhance fairness and trust among strangers are likely to be causally interconnected with the diffusion of several kinds of institutions. Here we focus on: the expansion of both the breadth and intensity of market exchanges (Bowles 1998; Ensminger 1992; Smith 1759/2000) and the spread of universal religions with high moralizing gods. At its most efficient, market exchange requires trust, fairness, and cooperation among individuals engaged in infrequent or anonymous interactions. The greater the shared set of motivations and expectations related to trust, fairness, and cooperation among interactants, the lower the transaction costs, the greater the frequency of beneficial transactions, and the higher the long-term rewards. Although reliable exchanges among strangers are now commonplace, studies of nonhuman primates and small-scale societies suggest that during most of our evolutionary history transactions beyond the local group, and certainly beyond the ethnolinguistic unit, were fraught with danger, mistrust, and exploitation (Fehr and Henrich 2003). Thus, “market norms” may have evolved as part of this overall process of societal evolution to facilitate and govern mutually beneficial exchanges in contexts where established social

relationships (for example, those based on kinship, reciprocity, or status) were insufficient.

At the same time, religious institutions, beliefs, and rituals may have coevolved with the norms that support complex societies. Competition among societies may have favored the spread of potent moralizing gods, along with the institutional and ritual machinery for instilling faith. These emerging religious systems may have helped incentivize prosocial behavior toward coreligionists (and the exploitation of non-coreligionists) using a range of supernaturally supplied rewards and punishments (Ensminger 1997; Norenzayan and Shariff 2008; Shariff et al. 2010), as well as rituals that built group solidarity (Henrich 2009; Sosis and Alcorta 2003). Thus, in contrast to the religions that probably dominated most of our evolutionary history, religions such as Christianity and Islam may be unusual in providing a moralizing god with omniscience and ample powers to reward and punish (Atran and Henrich 2010).

This process had been rolling along for thousands of years, and suddenly our team arrives on the scene with our suite of experiments designed to tap the norms that govern impersonal exchange. The kinds of cues that spark these norms involve money, the primary medium in such exchanges, and a lack of relevant information about one's relationship to the other party (anonymity).

This approach takes seriously the idea that norm-learning could result in internalized motivations both to adhere to—or fulfill—a normative expectation (endogenous preferences) and to think poorly of those individuals who fail to follow the norm. Consider this toy example: Suppose a learner grows up in a place in which a certain social behavior is expected in a certain context. Most people in our learner's world typically adhere to the norm, and those who occasionally do not suffer reputational damage or punishment. As a consequence of growing up in this environment, our learner internalizes a motivation to adhere to the social norm. Then our learner enters an experiment that taps the norm he has internalized. This occurs even though, in this experimental context, the learner fully believes that no one will ever know what he did and no reputational damage can ensue. In some sense, the learner's prosocial behavior is related to growing up in a society in which reputation and punishment matter, but not because he mistakenly believes reputation matters in the experimental context. Another learner from a society that does not damage the reputations of those

who fail to follow this particular social norm might have no guide in the experiment, except for self-interest and uncertainty (and perhaps empathetic altruism).

Anonymity Hypotheses Some researchers have proposed that the prosociality observed in behavioral experiments results from purely selfish motivations or genetically evolved mechanisms combined with an uncertainty about the anonymity in the experiments (Baumard, Boyer, and Sperber 2010; Delton et al. 2010). There are at least three versions of this idea. The first version proposes that individuals' beliefs regarding the reality of the anonymity in our experiments may have been influenced either by their experience in their daily lives or by calibrations to the local social environment (based on "cues") that reflect some ancestral world (and an associated evolved module for figuring out repeated interactions).[22] To clarify, using our earlier toy example, suppose a learner grows up in a society in which a certain prosocial behavior is sustained through reputation. But this fully self-interested learner does not internalize motivations; he only learns the rules and expectations of his group. He behaves prosocially *only* because of his assessment of the reputational effects or punishment. Then this learner enters our experiment. If he believes that the experiment is anonymous (that is, he perceives accurately), he will behave in a purely selfish manner, consistent with economic models that assume pure self-interest. However, since the experiment is a novel situation, he might bring beliefs and expectations derived from daily life into his game decision. By applying inaccurate beliefs about the effects of his play on his own future material payoffs, this learner ends up behaving more prosocially than predicted by models based on narrow self-interest. A parallel toy example can be provided for an evolved-module executor who is impervious to cultural learning.

Applying this reasoning predicts that people from societies with more actual ephemeral interactions and real anonymity (Western societies, for example) ought to be the best able to handle and understand the anonymity and behave purely selfishly. In these larger societies, people actually do have lots of interactions with strangers and in contexts lacking expectations of future interactions. If people's experience-derived beliefs or cue-calibrated modular expectations about anonymity are in fact driving prosociality in

these experiments, we would expect the smaller-scale societies to be *more* prosocial in the experiments, not less (Henrich et al. 2005b).

Our findings reveal precisely the opposite pattern from that suggested by these lines of hypothesizing. Empirically, the smaller-scale, least anonymous, and most face-to-face societies are generally less prosocial (New Guinea is the exception), while larger, more complex, and more anonymous societies are more prosocial. That is, the societies that live more like our ancestors in those small groups are actually less prosocial in these experiments. Results from both phases of our project confirm that market integration is highly correlated with offers, even in the DG and even when the local threat of punishment is statistically controlled for in the UG and TPG. Previously, we showed that anonymity in everyday exchanges (anonymous roles like "cashier"), market integration, and societal complexity are all highly correlated (Henrich,…and Gintis 2004). Moreover, if we treat CS or LNCS as a proxy for anonymity and face-to-face interactions in our populations, then our work shows that community size is not negatively associated with prosocial behavior, as predicted by this anonymity hypothesis. For offers, CS is never significant. However, if MI is removed from the regression, CS always has a *positive* coefficient, and it sometimes approaches significance. Overall, our findings do not support this version of the anonymity hypothesis, and this version cannot explain the empirical patterns we do find for MI, CS, and WR.

A second version of the anonymity hypothesis proposes that individuals from smaller communities may have avoided punishing because they feared that their actions might be found out and interpreted as an aggressive move against player 1. The idea is that the likelihood of being found out increases in smaller communities, thus yielding the observed relationship between community size and MinAO. When seen in the light of the offer data, we think this interpretation is largely consistent with our theory. To see this, first, recall that CS was not an important predictor of offers in any of the experiments. This means that somehow this anonymity concern was a factor only on the punishment side and did not influence offer decisions. Individuals from many smaller communities (though not all), such as in Fiji (chapter 9), entered the experiment and gave fairly, but were rarely willing to punish. Following our theoretical approach, this probably reflects local prosocial norms stabilized by reputational mechanisms, such as results from being dropped from dyadic helping networks (Panchanathan and Boyd

2004), and does not involve costly punishment. Costly punishment is, in fact, often frowned upon in these small communities because it can generate cycles of reprisals. Individuals who live in communities with norms maintained by such reputational mechanisms ought to show both fair behavior and an unwillingness to engage in costly punishment. As is the case for many norms (Henrich and Henrich 2007), habitually performed and frequently observed behaviors are partially internalized so that actions in daily life reflect some combination of internalized motivations (not to punish, in this case) and beliefs about, for example, the consequences of punishing. Thus, in our view, the unwillingness to punish in our experiments reflects the rules of daily life and arises from some combination of beliefs and motivations imported into the experiment from routine practices and interactions.[23]

Relevant to assessing this anonymity hypothesis, we performed these experiments among university students in the United States, as mentioned earlier (chapter 9). In an effort to approximate the small communities from which we drew our subjects, we randomly selected students from the same small freshman dormitory. If the size of the pool from which players are drawn influences their assessment of future potential anonymity and thereby causes them to punish less, then these students should have punished less than students in typical experiments, and potentially a lot less, since the pool sizes varied from one freshman dormitory to the entire university. Although a carefully controlled comparison is not possible, the results for punishment among these student subjects do not appear different from those observed in student samples drawn from larger, more anonymous populations. This finding suggests that merely manipulating the size of the pool of frequently interacting potential subjects is not driving the impact of the community size variable.

A third version of the anonymity hypothesis is that prosocial behavior in our experiments results from efforts to manage one's reputation with the experimenter (Levitt and List 2007). Inspiration for this effect comes from work using the dictator game involving experimenter-blind treatments (Cherry, Frykblom, and Shogren 2002; Hoffman et al. 1994; List and Cherry 2008) and work manipulating anonymity cues (Haley and Fessler 2005). Most experiments are single-blind, meaning that a player's behavior will never be known by the other players (and everyone is told this). In double-blind experiments, neither the other players nor the experimenters can figure

out what a specific player did. Among students, protocols that make the double-blind transparent (giving maximum confidence in anonymity vis-à-vis the experimenter) cause dictator game offers to decline. The approach could explain our variation if different populations varied in how much they wanted to impress the experimenter, and in a manner that happened to strongly correlate with MI, WR, and CS.

To put such experiments in a broader context, it is important to recognize two things. First, most of these effects have been limited to *students in dictator games.* Both students (Henrich, Heine, and Norenzayan 2010) and DGs are notorious for being relatively easy to manipulate using framing effects (Fehr and Schneider 2010). Second, a norm-learning approach offers a ready interpretation to these findings. Some student players find that the DG is ambiguous in terms of which norms apply, since it lacks the strategic conflict of other games. This ambiguity causes them to seize on otherwise minor framing effects to figure out which norms to apply to the game. The double-blind procedures provide strong cues—the game equivalent of neon signs—proclaiming: "No one is looking, and the experimenter wants you to behave self-interestedly; don't feel guilty about it." Psychologists call this well-known phenomenon an "experimenter demand effect." Attempting to remove concerns about the impacts of experimenter knowledge may actually dramatically raise experimenter demand effects by signaling to the subject how he or she is "supposed" to behave (cuing the subject as to what the norms are).[24]

Our project sought to address these concerns by running double-blind experiments among nonstudent subjects in four populations. Among the Orma and Samburu, we found no measurable impact of the double-blind treatment (chapter 5). Moreover, in the United States the standard finding using the DG with students, which reveals a large drop in mean offers, does not readily extend to nonstudent populations. Among U.S. nonstudent adults, we found a substantially diminished effect in the double-blind treatment compared to typical student findings. Among the Sanquianga in Colombia (chapter 16), we did find a strong impact in a quasi-double-blind treatment. Across our four comparative experiments, the two with no detectable effects for the double-blind treatments were conducted by non-coethnics of the participants. The U.S. experiment and the Sanquianga experiment were done, not by locals, but by conationals. This may suggest that people do not care what out-group others think of them. If that is the case, it reinforces our

results, since, with a couple of exceptions, our experiments were administered by out-group non-coethnics. This could also suggest that the large effects of double-blind procedures are an artifact of relying on Western student subjects with Western experimenters whose approval they seek.

Our previous work has also addressed the issue of experimenter anonymity by reasoning that if the variation we observe among populations results from different subject populations caring to differing degrees about what the experimenter might think, or believing different things about what the experimenter might do with the information, or possessing different beliefs about what the experimenter might want, we can control for this by including the number of months each experimenter had spent in the community prior to doing the experiments in our regression analyses on offers. The coefficient on this predictor was close to zero, and nonsignificant. Its inclusion had no influence on our findings (Henrich,… and Gintis 2004).

Finally, this anonymity hypothesis suffers because it cannot explain the strong relationship we find for MI, WR, and CS in our data.

Genetic Differences Across Populations Another hypothesis is that some of the variation in game play that we observe across populations arises from genetic differences across populations. This idea receives some support from recent work showing how cultural evolution can shape—and indeed, has shaped—evolutionary processes to yield patterns of genetic variation in humans (Laland, Odling-Smee, and Myles 2010; Richerson, Boyd, and Henrich 2010). Moreover, recent work combining tools from behavioral genetics with those of experimental economics has suggested that variation in behavioral game measures is partially explained by genetic variation. Using ultimatum game MinAOs, researchers have estimated a heritability of 0.42 and found no influence of common family environment among a large sample of Swedish twins (Wallace et al. 2007). Similar results obtain for the trust game, which measures trust and trustworthiness in anonymous interactions (Cesarini et al. 2008). Finally, within one population, there is work showing that high DG offers are associated with the longer microsatellite repeats for the arginine vasopressin 1a receptor (Knafo et al. 2008), a gene associated with bonding and affiliation in other species.

We think this evidence strongly indicates that some of the variation in game behavior *within* Western populations probably results from *individual*

genetic differences, especially given the heritability of so many other aspects of behavior and personality. However, we emphasize the pitfalls of logically extending within-group findings on heritability to understanding differences between populations, thereby committing the ecological fallacy. To understand this, let us start with variation in height. Within modern, industrialized, especially Western populations, height is highly genetically heritable. Does this mean that variation in height among populations is likely to be the result of genetic differences among populations? No. Height is greatly influenced by a variety of factors (childhood nutrition and disease, in particular), most of which are relatively constant in Western populations, at least in the middle and upper classes. This relative uniformity within the West maximizes the role of genetic variation in determining total phenotypic differences, because it reduces the potential role of environmental variation. This can be seen in the rapid decrease in, or disappearance of, height difference in immigrant populations (compared to the average of the new host population), as well as in the much lower estimates of heritability in places like China and Africa. It is quite possible that while most of the variation in human height within Western populations is genetic, much of the variation among other populations in average height is environmental. Similarly, IQ is highly heritable among middle- and upper-class Americans, but not heritable much at all among those from the lowest socioeconomic strata in the United States (Nisbett 2009; Turkheimer et al. 2003). This is probably because middle- and upper-class Americans have squeezed out nearly all the social, cultural, and environmental factors that influence IQ, leaving only the genetic variation. Where these factors have not been squeezed out, genes are relatively unimportant.

The variation we observe within genetically well-mixed ethnolinguistic populations speaks against any simple story about genetic variation in our experimental findings. With the Orma (Ensminger 2004) and Tsimane' (Gurven 2004), we found variation at the level of communities, with different communities revealing quite different behavior in our experiments. (We interpret this as meaning different norms have become locally stable.) In the case of the Orma, these patterns are consistent with historically recent differences in degrees of market integration that accompany sedentarization; more subsistence-oriented nomadic herders were less fair-minded than nearby settled, market-dependent Orma. We also found differences among Quichua and Achuar inhabitants of the same community in Ecuador (Patton

2004), and between Mongolian and Kazakh participants in Mongolia (Gil-White 2004). This kind of group-level variation is quite unlikely to be accounted for by genetic variation.

Norms, like nutrition in the case of height, are often more uniform within populations, but vary dramatically between populations. Thus, we also suspect that the heritability estimates for behavioral games, like IQ and height, will vary greatly among populations depending on the nature and strength of the local norms—a norm-heritability interaction.

It is also important to recognize that single-gene correlation studies done in a single population have not stood up robustly in replications in other populations. For example, H. S. Kim and colleagues (2010) found that a particular serotonin receptor polymorphism (5-HTR1A) was associated with *increased* attention to focal objects among Americans, but that the same allele was associated with *decreased* attention to focal objects among Koreans—same gene, different effects in different populations. The potential for complex gene-environment interactions makes single-gene correlations from a single population necessarily preliminary.

Genetic differences between populations or groups would most likely account for the behavioral patterns we observe if they arose in response to stable differences in the culturally evolved social norms and institutions (formal and informal) found in different societies. Norms and institutions, in creating stable regularities in the local social environment, can theoretically produce conditions for natural selection to act on genes that make individuals better adapted to those particular norms and institutions (Henrich and Boyd 2001; Laland et al. 2010; McElreath, Boyd, and Richerson 2003; Richerson et al. 2010). This is an intriguing and provocative possibility, but there is no evidence at this point supporting a suspicion that such a culture-gene coevolutionary process has occurred.

What Do Experiments Measure and Do They Tell Us Anything About the Real World?

A variety of researchers have criticized the use of laboratory game experiments, arguing that the lack of real-world context makes them difficult to interpret and that results from these experiments are not associated with any real-world outcomes (Baumard and Sperber 2010; Levitt and List 2007; Rai and Fiske 2010).[25] We think that both of these important concerns can be

addressed within the context of our theoretical approach, which explicitly theorizes about what the games measure, based on their salient contextual cues of cash and anonymity ("framing"), and how these link to real-world outcomes and measures.

Experimentalists in psychology have long recognized the importance of framing (contextual cues), though they have frequently lacked any general theory for explaining it. Sometimes experimentalists have attempted to sidestep this issue by maintaining that their experimental games are "frame-free," with the results measuring some dispositional social preferences. As chapter 2 makes clear, our approach to norms proposes that people acquire norms by making inferences about others' behavior in social contexts. Research among children shows that inferences from observed interactions result in quite context-specific behavioral tendencies, not dispositions. Children infer the rules of the game and quite energetically apply them to deviants (Rakoczy, Warneken, and Tomasello 2008; Rakoczy et al. 2010). But they do not apply them to different situations. For example, children can acquire altruistic preferences via imitation, but they do not readily extend that altruism to novel contexts (summarized in Henrich and Henrich 2007, ch. 2). Similarly, adults who would agree with admonitions against stealing or lying will also admit that stealing and lying are okay in some circumstances. In light of this, we interpret our experiments as context-specific measures of the presence of norms and motivations about how to treat someone for whom one has little information, in transactions involving cash. Based on our theory about what kind of norms the experiments tap, we arrived at our predictions about market integration, religion, and community size. We are exploiting the frame inherent in most economic games in testing our theory.

As mentioned, critics of the use of behavioral games have argued that many studies fail to show a relationship between game play and real-world behavior (Baumard and Sperber 2010; Levitt and List 2007; Rai and Fiske 2010). The problem with much of this criticism is that no theory is brought to bear to specify the real-world phenomena with which game play should be correlated. For example, Tage Rai and Alan Fiske (2010) note that behavior in Michael Gurven and Jeffrey Winking's (2008) experiments, for example, is not correlated with beer-making or well-digging among the Tsimane'. Why should it be? Our theoretical approach to social norms predicts that, if game play does tap norms evolved for interacting with strangers or

anonymous others, then these games ought to be associated with things like market integration, social scale (community size), economic success, and other features related to the operation of large-scale societies—features that capture those elements of impersonal interactions not governed by personal relationships. We show that, looking across diverse populations, market integration is indeed highly correlated with experimental measures of prosocial behavior in bargaining games. Similarly, antisocial punishment is inversely correlated with gross domestic product and predicted by national measures of the strength of the rule of law and measures of norms of civic cooperation (Herrmann et al. 2008). Within populations, trust game measures of trustworthiness predict repaying loans in a microfinance program in Peru (Karlan 2005), and they predict alumni donations (Baran, Sapienza, and Zingales 2010). Dictator game offers are correlated with both donations to Hurricane Katrina victims (Kam, Cranmer, and Fowler, n.d.) and political participation (Fowler and Kam 2007). Also using the DG, Abigail Barr and Andrew Zeitlin (2010) show that Ugandan teachers' time allocations to teaching are negatively correlated with their DG money allocations to parents of pupils at their schools. They go on to show that, using the same theoretical model as a guide, the correlation can be improved by taking into account differences in reference points, including social norms, and norm enforcement across schools and teachers. Overall, once properly theorized, economic games have been shown to correlate highly with several predictable and important real-world phenomena.

CONCLUSIONS: IMPLICATION FOR UNDERSTANDING THE OPERATION OF INSTITUTIONS

Our results show that prosocial behavior in situations involving cash and anonymity varies systematically across societies in patterns consistent with the emergence of social norms for governing social interaction among those not engaged in longer-term kin- or reciprocity-based relationships. These patterns of prosocial behavior, when combined with (1) findings showing that prosocial behavior (for example, costly punishment) activates neuronal reward systems, (2) developmental evidence showing the rather late emergence of this kind of behavior, and (3) research demonstrating the effectiveness of observational learning in transmitting both prosocial behavior and norms more generally, are consistent with the hypothesis that

specialized norms have culturally evolved over thousands of years to facilitate successful interaction and exchange with individuals who would otherwise be outside of a reliable long-term social relationship. Growing up in a world with such norms, and the institutions and religious systems that buttress and bolster these norms, favors the internalization of context-specific prosocial motivations that facilitate exchange (with low transaction cost) and cooperation in large, relatively harmonious groups.

NOTES

1. Whether we have added ten or eleven new populations in phase 2 depends on whether one counts rural Missouri as a new population or as a replication of the U.S. control experiment we did among graduate students in Los Angeles during phase 1 (Henrich and Smith 2004).

2. In phase 1, our sample from Lamalera (Indonesia) posted a mean UG offer of 57 percent (Alvard 2004). Subsequent work using our protocol found a high mean UG offer of 61 percent among the Sukuma in Tanzania (Paciotti and Hadley 2003).

3. To make this calculation we dropped players who made more than one switch between rejecting and accepting offers that ranged from 0 percent to 50 percent—a complex pattern indicating that one number cannot capture an individual's preferences. For example, if a player rejected 0 and 10 percent, accepted 20 percent, and then rejected from 30 to 50 percent, the MinAO could be set at 20 percent. However, this is not very informative, since this person rejects not only offers below 20 percent but also offers between 30 and 50 percent. Empirically, few players were dropped because of this restriction. We were able to calculate MinAOs for 96 percent of responders. Of the eighteen individuals for whom we could not calculate an MinAO, five were Hadza, two were Yasawans, three were Dolgan or Nganasan, and eight were Sursurunga.

4. Mean offers in the UG around 25 percent have also been found among the Machiguenga (Henrich 2000) and Quichua (Patton 2004), while the Pimbwe revealed a mean offer of 15 percent (Paciotti and Hadley 2003).

5. Benedikt Herrmann, Christian Thöni, and Simon Gächter (2008) deployed a public goods game with punishment across a diverse swath of industrialized societies (including Russia) and found "antisocial punishment" (a willingness to punish the overly cooperative) in many of the non-Western populations, but found little among Western undergraduates. Antisocial punishment in public goods games may be related to hyper-fair punishment in the UG.

6. The best-fit estimates of *r* in student populations using risky decisionmaking experiments is 0.81 (Tversky and Kahneman 1992). More details on this approach can be found in McElreath and Camerer (2004).

7. Theoretically, the highest possible IMO in the TPG is only 20 percent. It is possible for offers of 30 percent to have exactly the same expected income and utility as offers of zero, but if even one person fails to punish at zero, or mistakenly punishes at 30 percent, offers of zero still maximize income and utility.

8. In small-scale societies, kinship systems have culturally evolved to provide an organizing framework within which all in-group social relationships are regulated by norms that appear to extend and exploit our evolved psychologies for kin and reciprocity altruism—see Henrich and Henrich (2007) and Alvard (2003, 2009). Sometimes through elaborate rituals, these systems frequently include ways to bring in those outside the kinship system—creating fictive kinship relations that bring

prepackaged, established norms to bear on social relationships (Ensminger 2001). Often, interactions outside the systems are hostile and based on narrow self-interest and suspicion. With the possibility of larger-scale complex societies, we argue that norms regulating exchange beyond such kin- and reciprocity-based systems emerged and spread (see chapter 2 for our discussion of the mechanisms of that spread).

9. Injecting money into social interactions has distinct effects, at least among North Americans (Vohs, Mead, and Goode 2006, 2008). Giving someone money in exchange for something often signals a desire to avoid engaging in a longer-term nonmarket relationship (Heyman and Ariely 2004). Paying a date with cash, for example, after a satisfying evening suggests a different kind of interaction than providing exactly the same cash value in food, wine, and entertainment.

10. Technically, we predict more offers closer to fifty-fifty. However, since there were generally few offers greater than 50 percent, we used offers as the dependent variable instead of more complex formulations, such as the absolute value of 50 percent minus the offer (measured as a percentage of the stake). This formulation has its own problems, since the motivations favoring offers of 60 percent are probably not the same as those favoring offers of 40 percent, and we need not expect predictor variables to have the same symmetric effect on each side of 50 percent.

11. Note that for analyses using community size we drop the Accra sample. For those using wealth we had to drop both the Accra sample and the Dolgan/Nganasan sample owing to a lack of wealth data for these groups. For the same reason, the Gusii are dropped from analyses involving household size. Unless these variables are significant predictors in our baseline models, we then remove these predictor variables from our baseline analyses to show what happens when these samples are included (see chapter 3).

12. Versions of the supplementary analyses discussed here can be found in Henrich et al. (2010). However, since publishing that paper, we have discovered that there was a problem with the household size data for the Gusii (Chapter 12, this volume, available at: http://www.russellsage.org/Ensminger_Chapter12.pdf). This means that all the analyses discussed here deviate slightly from those found in Henrich et al. (2010) because the Gusii are now dropped from regressions using household size as a control variable. None of the substantive conclusions change.

13. Model 2 assumes *only* that our sites are statistically independent. We include this to address the concern that our participants might not represent fully statistically independent observations, since many participants were sampled from the same communities and populations. If true, this would mean that standard errors calculated assuming individuals are independently observed would be wrong. Although we think that this argument may misunderstand what statistical independence implies or requires, as our participants were alone in making their experimental decisions, we have taken this concern seriously and seek to address it in the analyses of each of our five game measures later in the chapter. We provide model 2 as a check on our baseline model (model 1), but we have not used clustered robust standard errors (clustering on site) in all our regressions because that would be excessively conservative.

14. Owing to findings in Bahry and Wilson (2006), we also ran models to look for any nonlinear effects of age, using age-squared, and found none.

15. Comparing UG and DG offers across all populations at the individual level, the Mann-Whitney nonparametric test obtains a p-value of 0.11. Thus, while not significant at conventional levels, it is probably the case that UG offers are higher than DG offers. When we run this test on each population, only the Sursurunga and Gusii show a significant difference at conventional levels. (The Maragoli reveal a p-value of 0.056.)

16. A person's DG offer may have set a reference point for the UG, given the temporal proximity of play in the two games. The effect of world religion could have been brought into the UG *via* the DG, though note that the coefficient on WR in the UG is generally larger than in the DG.

17. It is worth noting that all of the important results highlighted here can also be found using linear regression analyses that assume MinAO is a continuous, normally distributed variable.

18. If LNCS is dropped from the specification, the direction and effect of MI switches to positive while remaining significant. In fact, without LNCS in the model, the effect of MI changes direction and is significant across all of these specifications. MI and LNCS are correlated 0.6. The converse is not true: if LNCS is kept in the specification but MI is dropped, the effect of LNCS remains large (odds ratio about 2) and highly significant.

19. Methodologically, if we had used the standard method of eliciting minimum acceptable offers directly from responders in the ultimatum game, rather than our method of eliciting the full vector of decisions across all possible offers, we would not have observed the phenomenon of hyper-fair rejections. The standard strategy method design presupposes something about human preferences that turns out not to be very accurate for six of our fourteen populations. This is important because experimental designers sometimes use their own locale-dependent intuitions about what a sensible response is when they construct an experiment. In doing this, they can obscure variability.

20. Our theoretical approach to understanding religion proposes that religions that integrate beliefs in powerful moralizing gods who are willing to incentivize proper behavior with commitment-inducing rituals can help strengthen the acquisition and maintenance of prosocial norms among the faithful. What is theoretically relevant is not whether a system of religious belief is a world religion or is monotheistic, but instead whether it possesses varying degrees of these elements (Atran and Henrich 2010).

21. Neither beliefs nor motivations, in the technical sense meant here, should be confused with verbal expressions. The stuff people say may or may not reflect what they believe or want, and the part of the brain connected to the mouth may not even be aware of what a person believes or is motivated to do. So it is possible that people would be unable to express their beliefs and motivations to you, even if they wanted to.

22. This approach is called the *big mistake, or mismatch, hypothesis.* It proposes that humans do not have culturally evolved social norms, or at least that such norms do not explain game play. Instead, social behavior is governed (entirely) by a set of evolved psychological mechanisms that arose from the selective forces created by the action of reputation and reciprocity in small groups that have characterized much of human history (Burnham and Johnson 2005; Dawkins 2006; Hagen and Hammerstein 2006). An individual (not a learner, but a "module activator") enters the experiment and faces a social dilemma. He fails to fully interpret the anonymity of the situation—and thus the within-group fitness-maximizing behavior—because his social psychology misfires in this novel environment. There are two subvariants of this hypothesis that diverge at this point. This misfiring either activates other-regarding social motivations that propel prosocial behavior in small groups (like reciprocal dyads) or produces faulty beliefs about the anonymity of the experimental situation such that self-interest alone motivates prosocial behavior. Interestingly, proponents of this hypothesis often extend the logic to explain all larger-scale cooperation in modern societies—making the kind of larger cooperation we observe in the world today an out-of-equilibrium evolutionary "mistake" resulting from our long history in smaller-scale societies. Although this argument has superficial plausibility for some evolutionary researchers, it generally fails both theoretical and empirical tests (Cimino and Delton 2010; Chudek, Zhao, and Henrich 2013; Fehr and Henrich 2003; Henrich and Henrich 2007).

23. The fear that might deter a potential punisher from inflicting costs in the experiment can arise only if a certain community would judge this action as aggressive (and inappropriate). This depends entirely on local rules about appropriateness. For example, in some communities it is perfectly fine—encouraged even—to punch someone as hard as you can in the face, as long as you are in a boxing ring. In this light, one can just as easily run the anonymity hypothesis the other way. If individuals do not believe the anonymity, or believe it less in smaller communities, they should take the opportunity to demonstrate their commitment to fairness, their toughness, or their facility with "hard bargaining"

to their fellow community members by dishing out larger punishments. Community size should negatively predict MinAOs. In short, this anonymity hypothesis depends on local norms that influence how "punishing" is understood and judged. Thus, it falls broadly within our explanatory framework based on norms.

24. Unconsciously priming Christians with "God" before playing a double-blind DG increases fairness. God is apparently way more important than the experimenter, and there is no experimental treatment that blinds him/her/it (Shariff and Norenzayan 2007).

25. Levitt and List (2007) also argue that experiments suffer from a lack of attention to self-selection of the individuals into experiments and to the nature and extent to which one's actions are scrutinized by the experimenter. The first concern does not apply to us, since we used random samples of adults from our communities with little attrition. The second has been dealt with in our description of our use of double-blind experiments and our efforts to control for the experimenters' field experience.

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Chapter 5

Double-Blind Dictator Games in Africa and the United States: Differential Experimenter Effects

Carolyn K. Lesorogol and Jean Ensminger

The experiments reported in this volume consider the dictator game (DG) as a measure of fairness and altruism and attempt to understand cross-cultural variations in these characteristics. Thus, it is important to consider whether results in the dictator game are compromised by design features of the game. In this chapter, we discuss the problem of reactivity in experiments—the idea that experimental subjects' decisions may be affected by the experimental situation. In particular, we consider the possibility of "experimenter effects," in which subjects' decisions are influenced by their beliefs about the role or reaction of the experimenter. We use double-blind treatments to reduce the potential for experimenter effects by creating anonymity between the players and the experimenters. We compare results in these games to those in our standard, nonblinded DG protocol. Experiments from two African societies (the Orma and the Samburu) and one rural U.S. community are reported.

In the DG, one player is given an opportunity to share a stake of money with a second (anonymous) player. The second player receives whatever the first player gives him or her, and the first player retains whatever is not given to the second player. According to narrowly economically self-interested assumptions, player 1 should offer nothing to player 2, since the game is anonymous and player 2 cannot retaliate against player 1 in any way. In many experiments, however, player 1 consistently offers a positive amount to player 2, often as much as half the stake. Many researchers, including ourselves, have interpreted these offers as evidence that players have a taste or preference for fairness that prompts them to make positive offers even when there is every incentive to keep all the money (Fehr and Schmidt 1999; Ostrom 2000).

A number of researchers have argued that there might be other reasons for positive offers in the DG besides fairness and altruism, and they have designed a diverse array of experiments to try to pinpoint just what accounts for player behavior in this game (Burnham 2003; Carpenter, Liati, and Vickery 2010; Franzen and Pointner 2012; Hoffman et al. 1994; Hoffman, McCabe, and Smith 1996; Johannesson and Persson 2000). These efforts have led to several alternative explanations for player behavior in the DG and drawn attention to the ways in which small changes in how the game is conducted lead to important changes in player behavior.

One explanation for high offers in the DG is that (despite anonymity) players bring expectations of reciprocity into the game. That is, they may believe that if they are generous in the game, this will be rewarded in some way. Intersubject anonymity (that is, not knowing with whom one is playing) reduces expectations of reciprocity from other players in the experiment, but it does not affect players' expectations of reciprocity from the experimenter. Thus, when the experimenter is able to observe the offers players make, players may believe that the experimenter will respond to generous offers by extending some kind of benefit. For example, they may think that generosity will be rewarded by being invited back to play again, while greedy or selfish behavior might be punished by exclusion from future experiments (Bolton, Katok, and Zwick 1998).

Double-blind versions of the DG have been conducted to test for this kind of experimenter effect. These experiments, like the ones presented in this chapter, are designed in such a way that no one, including the experimenter, knows how much any particular player offers. The double-blind treatment provides both intersubject anonymity and subject-experimenter anonymity. If expectations of reciprocity from the experimenter are influencing players to behave more generously (rather than an intrinsic preference for fairness), then offers in the double-blind dictator (DBDG) should be much lower than in the conventional DG. In principle, the double-blind treatment has the effect of increasing the social distance between the subject and the experimenter, thus reducing the expectation of reciprocal behavior by the experimenter contingent on player behavior (Hoffman et al. 1996). Results from the DBDG to date are not uniform. Some researchers find significantly lower offers and frequencies of positive offers in the DBDG compared to the DG (Burnham 2003; Franzen and Pointner 2012; Hoffman et al. 1994; Hoffman et al. 1996),

while others find only slight reductions (Johannesson and Persson 2000), and others find no significant differences (Bolton et al. 1998). A recent meta-analysis finds no significant effects of double-blind treatments on dictator offers in a meta-regression (Engel 2011). These inconsistent results suggest that something other than the double-blind treatment is affecting player behavior in these experiments; later we discuss some alternative explanations for these findings that also help illuminate our own results.

Where there is evidence of an experimenter effect, it has implications for the conduct of economic experiments in two senses. On the one hand, if a significant experimenter effect is suspected, then it is advisable to design games using the double-blind protocol in order to reduce this confounding effect on player behavior. On the other hand, finding an experimenter effect is also instructive in enhancing our understanding of the motivations of players, which is an important goal of experimental research (for explorations of the conditions under which expectations of reciprocity will hold, see, for example, Cherry, Frykblom, and Shogren 2002; Cox and Deck 2005).

In this chapter, we present results from three DBDGs conducted as part of a larger cross-cultural experimental project. The experiments were carried out among two communities of livestock herders in Kenya and in one rural community in the state of Missouri in the United States. The objective of the experiments was to test for experimenter effects in a cross-cultural sample representative of local populations. The vast majority of experiments are conducted with university student subjects, primarily in the United States and Europe. In this study, we wanted to test whether experimenter effects were present in a cross-cultural subsample of small-scale societies. Somewhat counterintuitively, we found evidence for an experimenter effect in the U.S. double-blind field study, but not in the two African double-blind field studies. After presenting the experimental procedures and results, we discuss the factors that may explain our results, particularly in light of other inconsistent results in the DBDG literature. Specifically, we argue that cultural differences in beliefs about anonymity, framing effects, and the social distance between the experimenter and the subjects all may have accounted for player behavior in the DBDG in our experiments.

METHODS

Double-blind dictator games were played in three different communities between 2001 and 2003. Two of these were livestock herding groups in Kenya, the Orma and the Samburu. The Orma live primarily in Tana River District in the northern coastal region of Kenya. Although the Orma are distributed across a gradient from low to high market integration (corresponding in part to nomadic and sedentary lifestyles), this sample was from a more market-oriented society from largely sedentary villages (see also Ensminger 2004). The Samburu live in north-central Kenya and are semi-nomadic, often moving several times a year with their livestock, although the degree of mobility varies among households. Both the Orma and Samburu rely heavily on livestock products and the trading of live animals for their livelihood, but many of them earn income from wage labor and trade as well. The rural U.S. community was located in a small town in central Missouri. Participants were engaged in diverse occupations typical of small towns, including farmer, teacher, electrician, homemaker, unemployed, and factory worker.

The same experimental procedures were used in each community. People were invited to meet at a specified location (a school in Samburu, a school in Orma, and a community center and school in rural Missouri) to participate in the experiment. The particulars of the experiment were not explained before arrival at the game site, but participants were told that they were going to play some “fun games for real money.” For the DBDG, thirty-two Samburu, forty-six Orma, and fifty-eight U.S. players were randomly divided into player 1s and player 2s. The game instructions, which had been translated and back-translated in the local languages in Kenya (see appendix to this chapter) were read to each group. The instructions indicated that each player was paired with another player and that they would remain anonymous to each other. After reading the instructions, we showed participants several examples. Research assistants monitored the players while they waited to play to ensure that the game was not discussed among them prior to play. The experimenter gave each pair of players a stake of one day's minimum wage (in local currency in small bills or coins, allowing for division into at least ten units), and player 1 had to decide how to divide the money between him- or herself and player 2. These stakes translated into $50 games in the United States, $1.25 games among the Samburu (100 Kenyan shillings), and games of about $2.50 for the Orma (200 Kenyan shillings). Player 1s could offer any amount between

0 and 100 percent (divisible into ten or twenty units in Kenya and ten units in the United States) and would retain whatever was not given to player 2. Player 1s made their offers by placing the amount they wished to give to the player 2s in an envelope in a separate room so that even the experimenter would not know what they had given to player 2.

In random order, each player 1 was brought one at a time into a room where the experimenter repeated the instructions and asked several test questions to ensure understanding of the game. Each player 1 received a large manila envelope and the stake of money and was instructed to go alone to another room, place the amount he or she chose to give to player 2 in the envelope, keep the remaining money for him- or herself, seal the envelope, put it into a designated box that was well removed from all the remaining players and the experimenter, and then leave the game area. After all player 1s had finished and left the area, each player 2 was given one of the sealed envelopes. The envelope was then opened and the contents recorded.

RESULTS

It is notable that in all of our samples there appears to have been an aversion to offering nothing, even in the double-blind treatment. One of the differences between these sample populations and those typically used in economic experiments is that these were face-to-face societies where people lived in small communities. The population of the rural Missouri town where these experiments took place was only 1,800. Arguably, people there had internalized a norm that even in private, giving absolutely nothing under such circumstances is not appropriate. In contrast to earlier double-blind findings by Elizabeth Hoffman and her colleagues (1994), in which about 60 percent of offers were zero, there were no zero offers in Samburu or among the Orma, and only two (7 percent) among the rural U.S. field sample. Figure 5.1 presents histograms of the distribution of offers in the DG and DBDG for the three communities.

There was no significant change in the mean offer between the dictator game and the double-blind dictator game for either of the Kenyan communities. In Samburu, the mean offer in the DG was 32.9 percent, while in the DBDG it was 31.3 percent. The two distributions of offers are not statistically significantly different according to Mann-Whitney and

Kolmogorov-Smirnov nonparametric tests (see table 5.1). Among the Orma, the mean DG offer was 42.3 percent and the mean DBDG offer was 40.0 percent. Again, the distributions of offers in the two games were not significantly different. The rural Missouri sample did show a larger (and statistically significant) drop in offers, from 47.3 percent in the DG to 32.8 percent in the DBDG. In Colombia, Juan-Camilo Cardenas (chapter 16, this volume, available at: http://www.russellsage.org/Ensminger) ran a modified, sealed-envelope DG that mimicked a double-blind. In his study, the sealed envelope offers also declined.

DISCUSSION

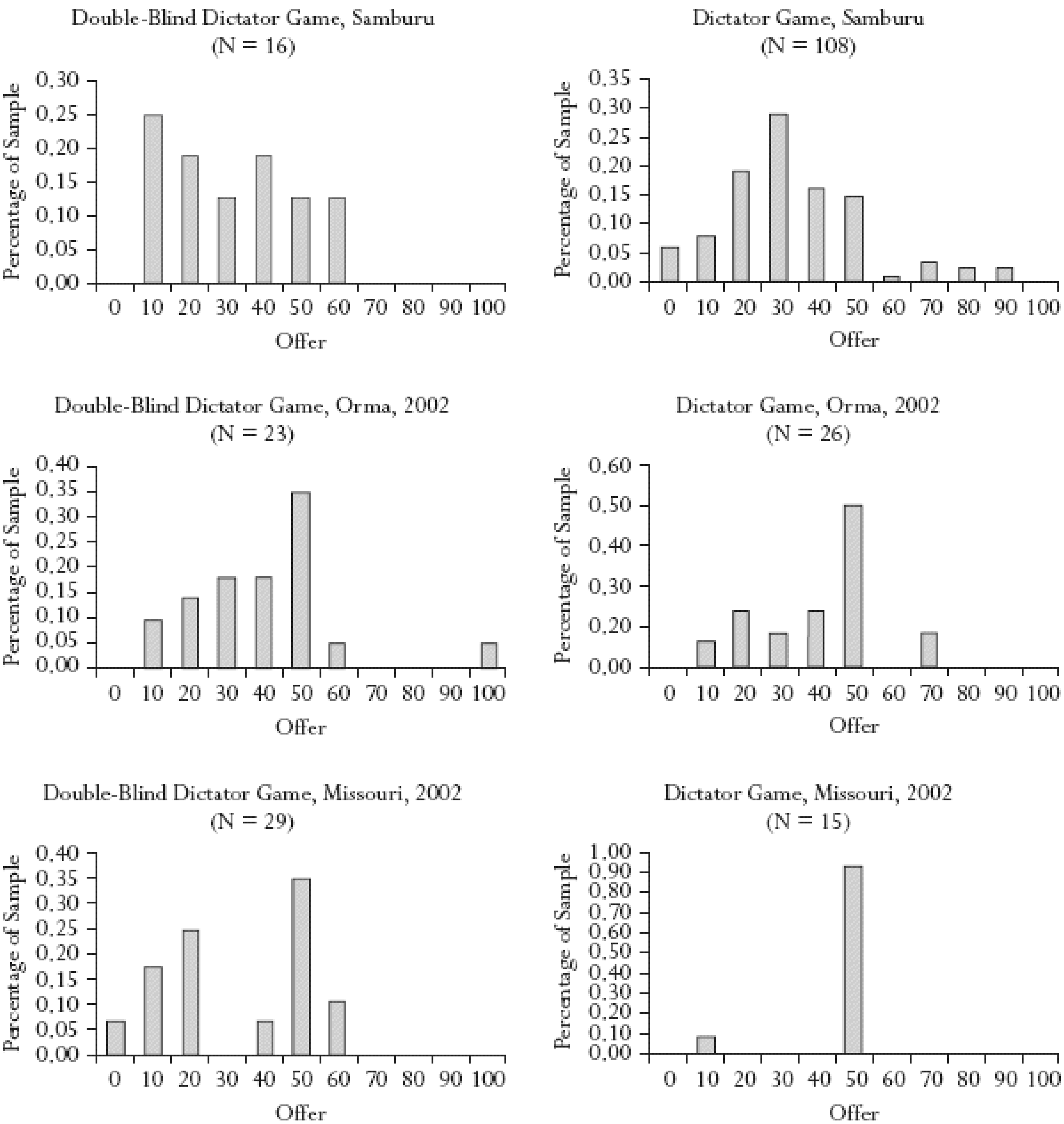
These results show that players in the dictator game continue to make positive offers to their counterparts even when anonymity is assured not only between subjects but also between the subject and the experimenter through the double-blind protocol. Interestingly, we did not find evidence of experimenter effects in our two East African societies, but we did in our rural U.S. community, though even there the drop-off in offers was less than might be expected based on U.S. laboratory studies. For example, in double-blind dictator games using U.S. university student samples, mean offers have varied between 9 and 15 percent of the stake, with between 53 and 64 percent of players offering 0 percent (Burnham 2003; Eckel and Grossman 1996; Hoffman et al. 1994), while in our Missouri sample mean offers in the DBDG were 32.8 percent and only 7 percent of players offered 0 percent. Thus, even though offers were significantly lower in the DBDG than in the DG in Missouri, they were much more generous than those in U.S. university samples.

Whether or not players' offers are known to the researcher does not appear to have a significant effect on the size or frequency of offers in some communities, but this may not be the case in societies where the researchers are perceived to be members of the same society. This is also consistent with Cardenas's findings from Colombia (chapter 16, this volume, available at: http://www.russellsage.org/Ensminger): with a Colombian national running a regular DG and a modified “sealed-envelope” DG, there was a decline in offers. We must still ask why this was the case and how these results fit with other similar experiments, especially those that find a large

drop in offers in the DBDG (Cherry et al. 2002; Cox and Deck 2005; Franzen and Pointner 2012; Hoffman et al. 1994; Hoffman et al. 1996).

A number of explanations are plausible. One explanation is that cultural differences account for these results. Specifically, it may be the case that true anonymity is rare and not highly valued in small-scale communities. Among the Samburu and the Orma, for example, most transactions take place face to face, people in the community know each other well, in many cases having lived together their entire lives, and there is a low level of personal privacy. The very notion of anonymity is relatively unfamiliar to many individuals, since there are few occasions when anonymity would be called for in people's daily lives or would be possible if desired. A lack of confidence in or value for anonymity would account for the low variance between the DG and DBDG treatments, since the additional guarantee of anonymity may not affect player behavior if the concept is not meaningful to them. In recent experiments, Axel Franzen and Sonja Pointner (2012) used a randomized response technique that they argue provides a higher degree of certainty of anonymity than normal double-blind procedures, and they did find lower offers using this approach compared to a protocol similar to that used by Elizabeth Hoffman, Kevin McCabe, and Vernon Smith (1996). Such experiments may help to further reduce reactivity in experiments and are worth testing in societies such as the Samburu and Orma, where the concept of anonymity itself may not be salient.

FIGURE 5.1 *Dictator Game and Double-Blind Dictator Game Offers in Each Site*



Source: Authors' compilation based on author data.

TABLE 5.1 *Statistical Tests of Null Hypothesis Comparing Offers for the Double-Blind Dictator Game and the Dictator Game for Each Site*

Site	Dictator Game Mean	Double-Blind Dictator Game Mean	Mann-Whitney Test z Score	Kolmogorov-Smirnov Test z Score
Orma	42.3 ($n = 26$)	40.0 ($n = 23$)	−0.82	0.50
Samburu	32.9 ($n = 108$)	31.3 ($n = 16$)	−0.27	0.42
Missouri	47.3 ($n = 15$)	32.8 ($n = 29$)	−2.20*	1.52**

Source: Authors' compilation based on author data.
*significant at 0.03 level
**significant at 0.02 level

If anonymity is not assured, in the minds of the players at least, then they are likely to play the game as if they were in public; then their concerns for their reputation become salient. While anonymity may not be highly valued in these communities, reputation is. For example, in both Orma and Samburu culture, generosity is very highly valued and serves as a means to compel wealthier herders to share their wealth with poorer ones. This type of redistribution (and the associated value placed on a reputation for generosity) is highly functional, particularly in a society where the centralized state is a recent phenomenon and remains relatively remote, so that mutual assurance depends heavily on internal modes of sharing and redistribution. A reputation for generosity is an important attribute of a worthy individual, and offers in the experiment may reflect this deeply internalized cultural norm. If many players perceive the situation this way, it may help explain the rather generous offers made by many communities in the DG and other similar bargaining games when compared to university samples in the United States.

The fact that there was more evidence of an experimenter effect in the Missouri sample is consistent with this explanation. Although the Missouri sample shared some characteristics of a small-scale society with the Kenyan samples, people in the United States, even in rural areas, are often involved in anonymous exchanges (for example, over the Internet) and have more expectation of personal privacy than people in Kenya. Accordingly, they may respond more when anonymity guarantees are extended, and this is consistent with declining offers in the DBDG.

Another explanation of these results, especially salient in comparisons with other DBDGs, is the effect of framing. A number of studies have

shown that differences in the wording of the instructions or in the context of the game affect offers. For example, Hoffman and her colleagues (1994) have demonstrated that offers in the DG fall when player 1 has to earn the right to the stake by winning a contest. This result has been replicated in other studies (Cherry et al. 2002; Carpenter et al. 2010) and suggests that when player 1's right to or ownership of the stake is more firmly established, offers to player 2 tend to be less generous.

Different game contexts have also resulted in different patterns of offers. In the same study just cited, Hoffman and her colleagues (1994) found that offers were lower when the DG was described as a market exchange compared to abstract instructions. Catherine Eckel and Philip Grossman (1996) found a similar contextual effect in a DBDG: players offered more when the recipient was a well-known and worthy charity, the American Red Cross, than when it was an anonymous other player. Carolyn Lesorogol (2007) found that when the DG was contextualized to resemble a well-known local norm for meat-sharing among the Samburu, offers were consistent with that norm and far less variable than in the abstract version of the DG.

In our game instructions, the stake was clearly allocated to the pair of players, not just to player 1. In contrast, in the DBDG conducted by Hoffman and her colleagues (1994) and some subsequent replications (Burnham 2003; Johannesson and Persson 2000), the instructions did not stipulate that the stake was allocated to the pair. Instead, the stake was given to player 1, who was then given the chance to give some to player 2. By allocating the stake to the pair, our instructions implied that player 2 also had rights in the stake and therefore might have triggered offers that approached an even split, which constitutes a fair division of a shared resource. Robert Forsythe and his colleagues (1994) used instructions like ours, allocating the stake to the pair, and the distribution of offers in the DG in their experiments was similar to ours. (They did not do the DBDG.) Hoffman and her colleagues (1994) replicated the DG results of Forsythe and his colleagues (1994), but their instructions in the DBDG were different —shifting from allocating the stake to the pair to giving it to player 1. Subsequent replications of the DBDG have used the same directions used by Hoffman and her colleagues (1994), not Forsythe's directions, and this difference in property rights to the stake may have contributed to the differences in play observed in the DBDG.

Allocating the stake to both players may influence player 1 to give to player 2, even under conditions of anonymity, because it elicits a fairness norm. Although all societies arguably value fair-minded behavior to some extent, for the Orma and Samburu norms of fairness and sharing take on great significance given their heavy reliance on other community members for their own survival. Living in difficult environmental conditions characterized by frequent droughts and other risks (such as epidemics among both people and animals, or insecurity due to cattle raiding), people in these communities are highly interdependent and, as noted earlier, have well-developed systems of mutual reciprocity and local leveling institutions that reinforce sharing and redistribution of resources. Thus, offers may remain relatively generous, even under the double-blind treatment, if the game instructions trigger norms regarding generosity and sharing and people are playing as if in public.

A third explanation hinges on the identity of the experimenter—specifically, whether or not the experimenter is a member of the players' society, and the perceived social distance between the experimenter and players. In our case, as Americans, we are non-native researchers in Kenya, but native researchers in the United States. If the experimenter is perceived as outside the social orbit, players may perceive less need to ingratiate themselves with the experimenter, or less benefit from doing so. Second, it may be the case that players in rural Missouri were more concerned about how their behavior would be judged by the experimenter, for whatever reason. In Kenya, however, players may be less concerned about how their offers are viewed by non-native experimenters who are not members of their society and culture, and that may also explain why they are relatively unaffected by guarantees of subject-experimenter anonymity. The behavior of subjects also appeared consistent with this notion, as many subjects appeared decidedly unconcerned about how their behavior might be viewed by the experimenter. This argument is mitigated, however, by the fact that each researcher has long-standing ties to one of these Kenyan communities and is not a complete stranger; both are regular visitors who spend considerable time in these sites. Even so, there is probably some difference in the expectations that players have of native and non-native researchers, and this question may merit further exploration.

CONCLUSIONS

Experimental results in the double-blind dictator game played in three communities provide little evidence of experimenter effects on player behavior in the Kenyan samples, but more in a U.S. rural sample. Mean offers and frequency of positive offers do not change significantly between the DG and DBDG in the Kenyan sites, while there is a significant drop in offers in the U.S. site. Cultural differences in the experience of anonymity (between the United States and Kenya) and the differences in social distance between the experimenter and the players are two possible explanations for these differences. If players do not value anonymity, or if they lack confidence that true anonymity is achieved by game procedures, then they play the game as if in public, and concern for their reputation may influence their offers. The cultural identity of the experimenter, whether native or non-native, may affect the degree to which players have expectations of reciprocity or fear social judgment. Concomitantly, the game instructions allocating the stake to the pair of players frames the game as the division of a shared resource and may trigger a norm of fairness and sharing that influences offers in a generous direction regardless of experimenter observation. We note that even though offers did drop in the U.S. DBDG, they did not drop nearly as much as has been observed in other versions of the game with different framing effects. Further work is required in these communities to tease out the differential effects of these alternative explanations. Replicating the DBDG with the directions given by Hoffman and her colleagues (1994) allocating property rights over the stake clearly to player 1 would be a test of the strength of this framing effect. Experimenting with changes in the ethnic pairing of the experimenter with the subjects would assist in determining the impact of this variable. Further exploration of how communities view anonymity would help clarify their reaction to protocols that attempt to manipulate this parameter.

APPENDIX: GAME INSTRUCTIONS TO PLAYER 1S

The following instructions are to be back-translated:

This game is played by two individuals—player 1 and player 2. No one knows with whom they are playing, and they never will know. Each of you in this room is a player 1; each of the people in the other room is a player 2. [*Researcher's name*] will provide $10 [*this is converted to one day's*

minimum wage in the local currency] to each pair. As a player 1, you will decide how to divide the money with player 2. You must offer between $0 and $10 to player 2. You will take home whatever you do not offer to player 2, and player 2 will take home whatever you have offered him or her from the $10. You will be sent to a private room with $10 and an empty envelope. You will decide how much of the $10 you wish to keep for yourself and put that away in a pocket or private place. Put the amount you wish to send to player 2 inside the envelope. When you return, place the envelope in this large box and leave the game area immediately; you have finished the game. No one will know which is your envelope. After all of the player 1s in this room have finished making their offers, [*researcher's name*] will mix up the envelopes and take the box into the other room. Each player 2 will receive one envelope and keep the money that is inside.

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Part II

Society Case Studies

The chapters in Part II are available for download at https://www.russellsage.org/publications/experimenting-social-norms

Chapter 6

Better to Receive Than to Give: Hadza Behavior in Three Experimental Economic Games

Frank W. Marlowe

High levels of cooperation can be achieved via strong reciprocity in which individuals cooperate with cooperators, defect on defectors, and punish even those who defect on third parties (Fehr, Fischbacher, and Gächter 2002). Much human cooperation could have its origins in the extensive food-sharing that is typical of hunter-gatherers, and food-sharing could be based on strong reciprocity. If so, then we might expect that in games that measure norms of sharing, hunter-gatherers would cooperate by sharing stakes equally, would punish those who do not share with them equally, and would punish third parties who do not share the stakes equally with others. Here I report on three games that measure norms of sharing, the dictator game (DG), the ultimatum game (UG), and the third-party punishment game (TPG), which I played with Hadza hunter-gatherers of Tanzania in 2002 as part of a cross-cultural, experimental economics project (see chapter 3).

The results of the 2002 games were largely consistent with earlier results in the DG and UG that I played with the Hadza in 1998 (Marlowe 2004a, 2004b). As in the 1998 DG and UG, the Hadza in 2002 gave low amounts to their partners in these games relative to other societies tested here and previously (Henrich et al. 2004; Marlowe 2009; Marlowe et al. 2008; Marlowe et al. 2011). The only predictor of offers in 1998 was camp population, with people in larger camps giving higher offers. Population was not a significant predictor this time. The best predictor of offers was head of household status, with household heads giving higher offers.

As in 1998, the Hadza rejected at a high rate low offers given to them when they were in the role of the receiver, but the TPG revealed that they did not punish at a high rate those who gave low offers to third parties. Even though these games were one-shot and anonymous, unlike their daily

interactions, deciding how much money to give another might remind the Hadza of the situation they face every day when they give food to others. If it does, the combination of low offers, high rejections, and low punishment of third parties indicates that strong reciprocity is a poor explanation of Hadza food-sharing.

THE HADZA

The Hadza are hunter-gatherers who live in northern Tanzania in a savanna-woodland habitat. The total population is about one thousand. The Hadza live in camps that average twenty-nine people, and they move four to ten times a year (Marlowe 2002, 2006). During the dry season, camps grow larger because there are only so many permanent waterholes. In these larger camps, there is noticeably more bickering, as the Hadza themselves point out. During the rainy season, water is no constraint, so large camps break up into many smaller camps. People often visit or move into other camps, and this fluid movement partly explains Hadza egalitarianism: anyone who is bothered by someone trying to boss them around can simply move away from the bossy person (Vehrencamp 1983).

The Hadza enjoy great individual freedom from an early age, and there are few socially imposed rules. There is no wedding ceremony, and marriages are not arranged. First marriages follow brief courtship and premarital sex. If all goes well, the couple soon begins living together. The age at first marriage for females is seventeen years and for males twenty years. About 4 percent of the men have two wives (Marlowe 2003). There is a fairly high rate of divorce, so the best term to describe the mating system is “serial monogamy” (Blurton Jones et al. 2000). Couples live with the kin of the wife or the husband, or both, or neither. In a census of couples whose mothers were alive, 68 percent were living in the same camp with the wife's mother (Woodburn 1968).

The Hadza are central place provisioners (Marlowe 2006). They often feed themselves while foraging, but they also take food back to camp. Men collect honey and use bows and arrows to hunt game that ranges in size from small birds to giraffes (Marlowe 2002, 2003). Men usually go hunting alone during the day, but during the late dry season they wait at waterholes to ambush animals that come to drink. They always do this in pairs because of how dangerous it is: other predators use the same hunting strategy. Once

an animal is hit, the hunter often returns to camp and gets other men to help him track the wounded animal. During honey season, men use the axes they make to break into beehives. While men usually go alone, a man's wife may join him when he goes for honey and she will forage for other foods, and sometimes men go for honey in groups of two or three. When men bring honey back to camp, it often gets shared with those present, but unlike larger game, it can sometimes be concealed and then directed to a man's household (Marlowe 2003). When men bring medium-sized and large game into camp, it is shared with all others, and each household gets pretty equal shares (Hawkes, O'Connell, and Blurton Jones 2001). There are no formal rules about who gets how much meat or what parts, other than the few special parts of large game animals (neck, heart, liver), which are supposed to be eaten only by grown men (Woodburn 1998).

Women gather fruit and berries and dig tubers. They usually go foraging every day in groups of three to eight (Marlowe 2006). A mother will take her nursing infant with her, but leave her weanlings in camp. Once children reach about seven or eight years old, they may accompany the women on forays. By ten years of age, children are able to acquire about half of the food they need (Blurton-Jones, Draper, and Hawkes 1994). When women are digging tubers, they often help others. For example, a woman may lever large boulders up so that another woman can get at the tuber, and sometimes they take turns digging the same tuber. Women may also help each other when they are picking berries. For example, one woman may pull a branch down so that another can reach the berries. In general, there tends to be less cooperation when women are collecting baobab fruit off the ground. Even though, relative to men, more of the food women take back to camp is shared only within the household or with close relatives, a considerable amount is also shared with others.

METHODS

The standard protocol for our project was followed (see chapter 3). Here I describe only those methods that varied by site and researcher. To avoid the possibility that people would influence others with their comments while all were gathered to listen to a group instruction, instructions for the games were not given in a group setting, but only in private just before play began.

The stake in all three games was 2,000 Tanzanian shillings, which is about one day's wage in Tanzania.[1] The money consisted of ten 200-shilling coins, which worked as a visual aid. Because the Hadza have no written language and most of them have had very little, if any, education, dealing with numbers is difficult for most Hadza. Using the ten coins made it easy to do the addition and subtraction necessary to figure out how much money would go to each player, because the ten coins were laid out in front of them and they could move them around.

The games were played in six different camps altogether, with populations of twenty, twenty-two, twenty-four, twenty-seven, twenty-nine, and seventy-six. The DG and UG were played in four of these camps and the TPG in three of the same camps, plus two others. I played with each player individually. As there were no buildings, the only place where one could have some privacy was in the car. Thus, I sat with the player in a Land Rover with the windows covered so that anyone standing outside could not see in, and I alone gave instructions to each player. Then trials were run to ensure that players understood the games before actually beginning to play.

RESULTS

Altogether, 111 people played in the three games. Thirty-one pairs played the DG and UG, and 27 threesomes played the TPG. All sixty-two people played in the same role of either player 1 or player 2 in the DG and UG. Among those, thirteen player 1s were also a player 1 in the TPG, and sixteen player 2s were also a player 2 in the TPG. One player 1 was a player 3 in the TPG, and one player 2 was a player 3 in the TPG. In the sample as a whole, there were sixty-four men (mean age = 36.1, standard deviation = 14.6) and forty-seven women (mean age = 36.3, standard deviation = 16.0). Figure 6.1 shows the demographics of the total sample in all three games.

In the DG, the modal offer was 0 percent (mean = 26 percent, standard deviation = 25, N = 31). In the UG, the modal offer was 10 percent (mean = 26 percent, standard deviation = 17, N = 31). In the TPG, the modal offer was 0 percent, with a secondary mode at 50 percent (mean = 26 percent, standard deviation = 19, N = 27) (see figure 6.2). The means are all very close to the means of offers in 1998, though the modal offers were lower this time (table 6.1).

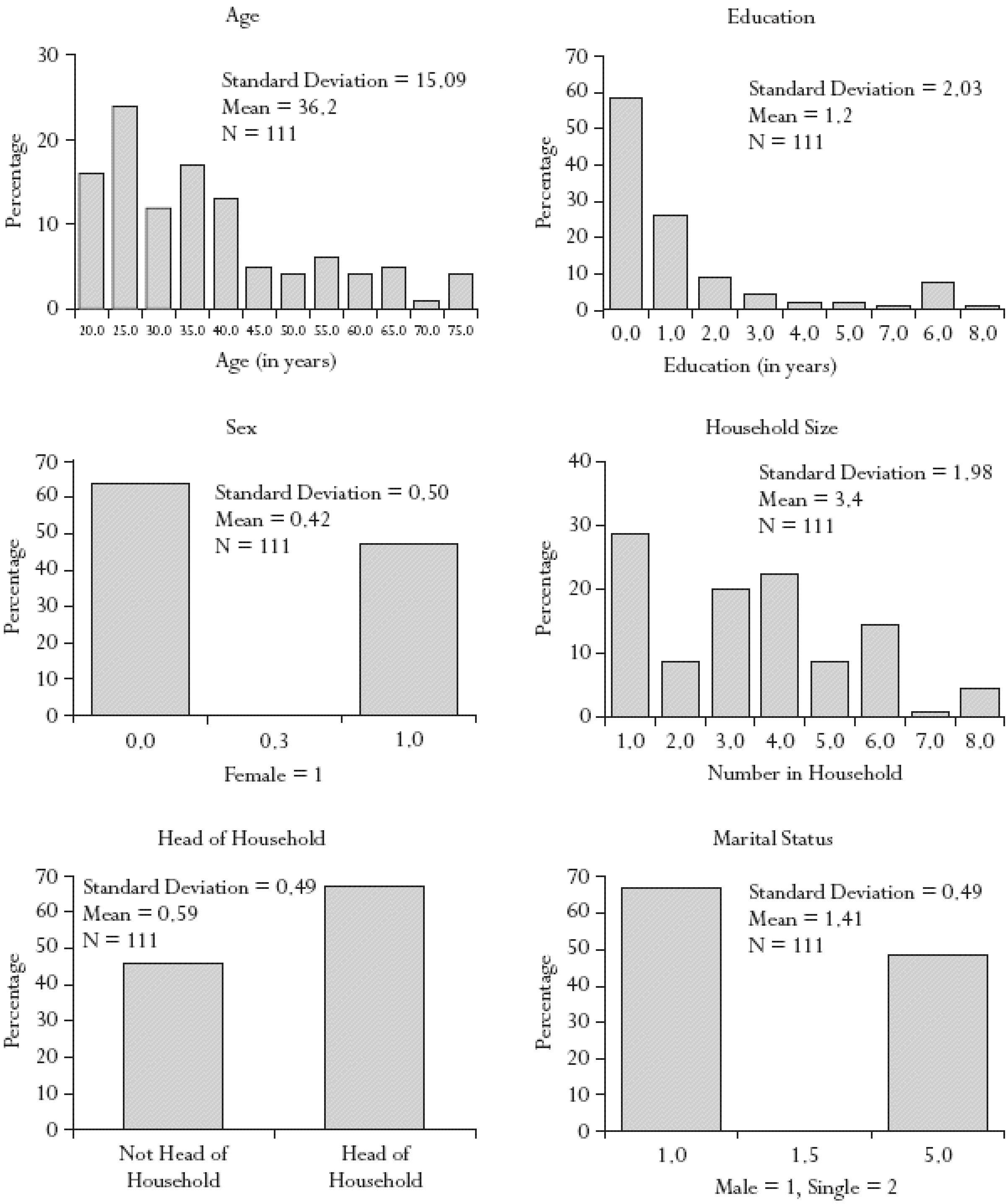
There were no significant sex differences in offers, though men gave slightly higher amounts in all three games (DG mean: male = 31 percent, female = 18 percent; UG mean: male = 29 percent, female = 22 percent; TPG mean: male = 33 percent, female = 19 percent). There were also no significant sex differences in the tendency to punish in the TPG or to reject in the UG.

Offers by player 1 in the DG were correlated with their offers in the UG (r = 0.498, p = 0.004, N = 31). There was also a weakly significant correlation between offers in the UG and the TPG (r = 0.488, p = 0.091, N = 13). There was no correlation between the offers in the DG and those in the TPG (r = 0.155, p = 0.613, N = 13).

Offers by player 1 in the DG were somewhat higher if he or she was a household head (Mann-Whitney U = 47, p = 0.085, N = 31) (figure 6.3). Household heads were husbands for couples living together. In one case a woman was married but her husband was off working in a game park for a long time, so she was the household head. Single women were considered the household head unless they were very old and living with a son or daughter or an elderly sister or friend, in which case neither was considered the head. In two cases single women were living with their mothers, who were considered the household head because they still had young children of their own. Single men were considered household heads unless sharing a sleeping spot with other single men, in which case none were considered the head.

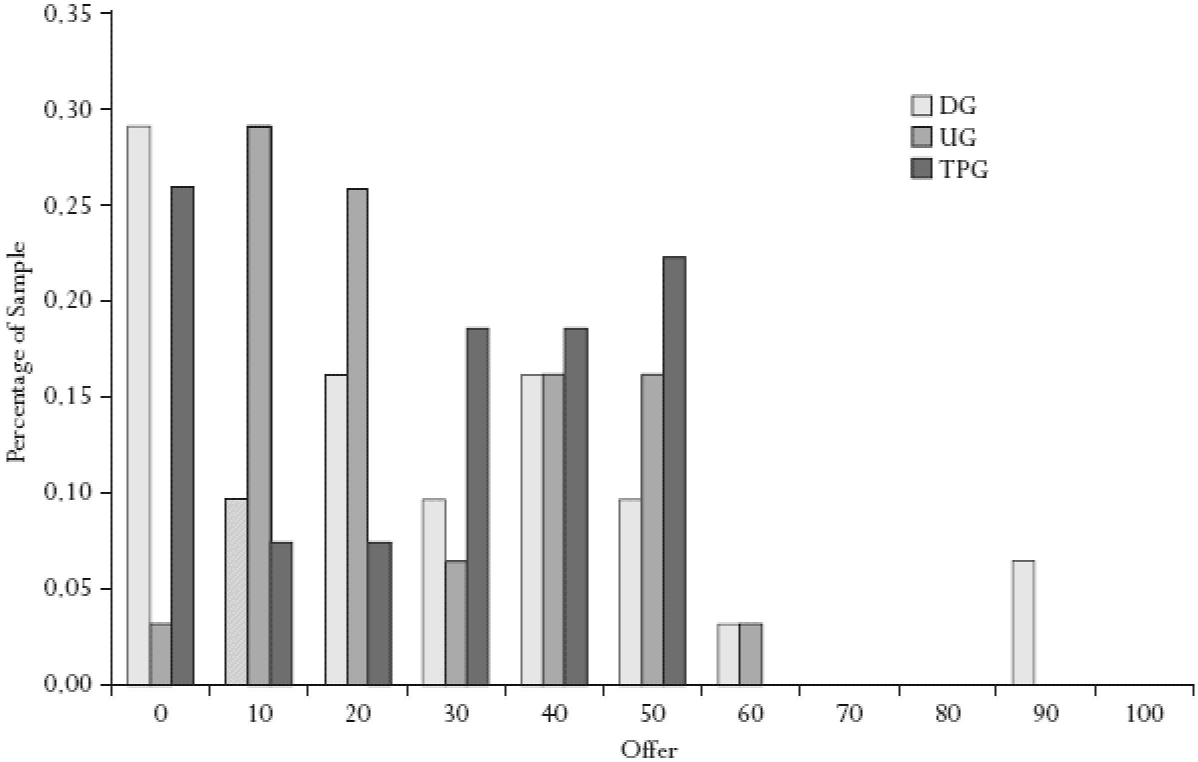
A multiple linear regression of DG offers onto the independent variables of age, sex, education, and household size revealed that none were significant predictors (table 6.2). Since income and household wealth have no meaning among the Hadza, I omitted these variables. After controlling for these four variables, single people gave lower offers than married people did in the DG. Entering head of household status along with marital status led to the best model, with household heads giving higher offers, though only 15 percent of the variance is explained.

FIGURE 6.1 *Demographic Characteristics of the Hadza*



Source: Author's calculations based on author data.

FIGURE 6.2 *Hadza Offers in the Dictator Game, the Ultimatum Game, and the Third-Party Punishment Game*



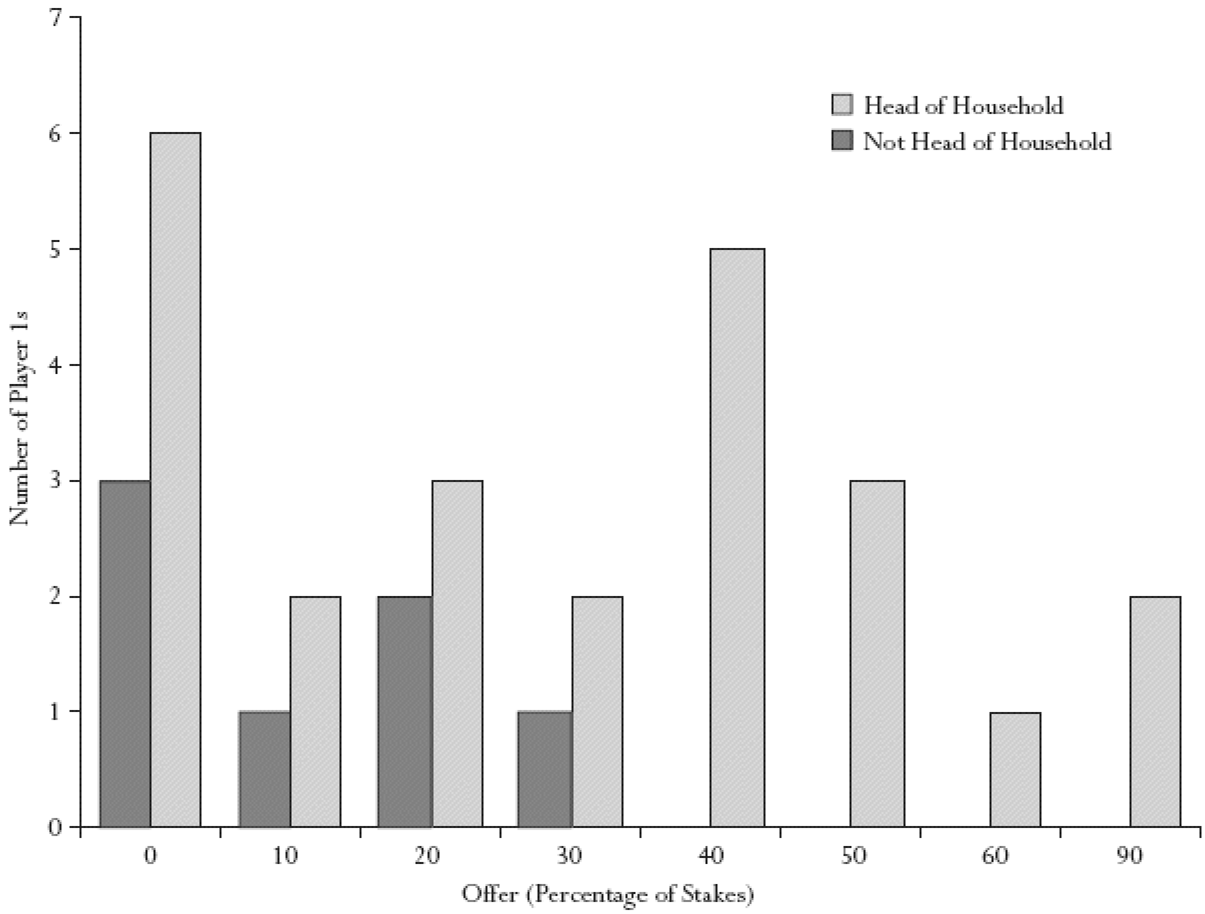
Source: Author's compilation based on author dates.

TABLE 6.1 *Results in the 2002 Round Compared to the 1998 Rounds*

	DG	UG	TPG
1998			
Mode	10	20	
Mean ± Standard deviation	20 ± 16.2	33 ± 17	
N	43	55	
2002			
Mode	0	10	0
Mean ± Standard deviation	26 ± 25.26	26 ± 16.6	26 ± 19.4
N	31	31	27

Source: Marlowe (2009), reprinted with permission.

FIGURE 6.3 *Hadza Dictator Game Offers by Head of Household Status*



Source: Author's compilation based on author data.

In a regression of UG offers onto the same independent four variables, only age was a significant predictor (table 6.3). Older people gave higher offers, controlling for the other variables. Again, when marital and head of household status were included, the best model was achieved with household heads giving higher offers. In this model, an appreciable 45 percent of the variance is explained. Without controlling for other variables, household heads gave marginally more than nonheads (Mann-Whitney U = 0.43, p = 0.054, N = 31) (figure 6.4).

In a regression of player 1 offers in the TPG onto the same variables, head of household status was again the best predictor, though only 9 percent of the variance is explained (table 6.4). In a simple comparison, household heads gave slightly higher offers (Mann-Whitney U = 51, p = 0.062, N = 27) (figure 6.5).

In the UG, 77 percent of player 2s rejected offers of 10 percent or less, which resulted in 65 percent of all offers actually being rejected, a higher rate than in 1998 (24 percent). Seventy-five percent of men rejected the amount of the offer they received, while 50 percent of women rejected their offers.

TABLE 6.2 *Linear Regressions of Hadza Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	3.01				
	(4.67)				
Female	4.20	5.32			
	(14.06)	(13.79)			
Education	−1.26	−1.40	−1.90		
	(4.82)	(4.76)	(4.51)		
Individual income (U.S. dollars)	—	—	—	—	
Household wealth (U.S. dollars)	—	—	—	—	—
Household size	−4.09	−3.69	−3.76	−3.59	
	(5.35)	(5.25)	(5.16)	(5.07)	
Single	−20.60*	−21.00*	−19.49*	−19.51*	−16.34*
	(11.01)	(10.86)	(9.97)	(9.81)	(8.66)
Head of household	24.82	27.57*	23.13**	22.22**	23.85**
	(16.83)	(16.09)	(11.07)	(10.69)	(10.35)
Constant	35.64	40.93	44.51*	43.95*	32.44**
	(25.88)	(24.25)	(22.04)	(21.66)	(14.20)
Observations	31	31	31	31	31
Model significance	0.307	0.233	0.146	0.080	0.041
Adjusted R-squared	0.051	0.074	0.104	0.131	0.147

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

TABLE 6.3 *Linear Regressions of Hadza Ultimatum Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	8.93***	9.05***	9.13***	9.07***
	(2.47)	(2.41)	(2.36)	(2.31)
Female	2.85			
	(7.43)			
Education	−.74	−1.00		
	(2.55)	(2.41)		
Individual income (U.S. dollars)	—	—	—	—
Household wealth (U.S. dollars)	—	—	—	—
Household size	−0.64	−0.69	−0.61	
	(2.83)	(2.78)	(2.73)	
Single	−10.39*	−9.58*	−9.59*	−9.06*
	(5.82)	(5.33)	(5.24)	(4.60)
Head of household	15.09	12.64**	12.12**	12.42**
	(8.90)	(6.09)	(5.86)	(5.60)
Constant	7.80	9.48	9.03	7.22
	(13.68)	(12.73)	(12.48)	(9.35)
Observations	31	31	31	31
Model significance	0.005	0.002	0.001	0.000
Adjusted R-squared	0.390	0.410	0.429	0.449

Source: Author's calculations based on author data.

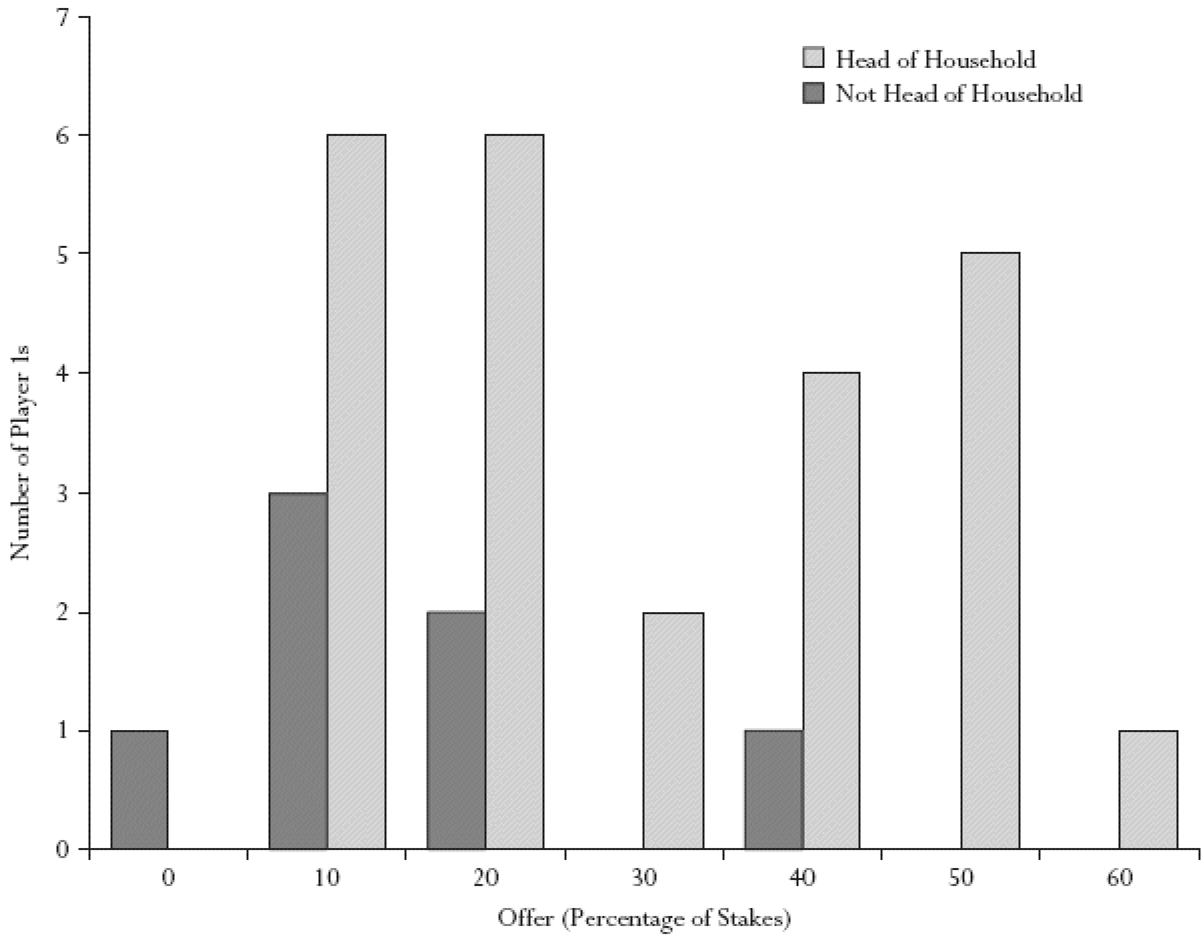
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

FIGURE 6.4 *Hadza Ultimatum Game Offers by Head of Household Status*



Source: Author's compilation based on author data.

Hadza player 1s played a sensible strategy in both the UG and the TPG: the modal offer in the UG was 10 percent, which was also the income-maximizing offer (IMO), and the modal offer in the TPG was 0 percent, which was likewise the IMO (figure 6.6).

After controlling for the same four variables, the minimum acceptable offer (MinAO) in the UG was predicted by camp population, with those in larger camps requiring higher offers before accepting (table 6.5). This could explain why player 1s in the UG gave higher offers in larger camps in 1998.

In the TPG, only 27 percent of player 3s said that they would punish offers of zero. This resulted in 22 percent of player 3s actually punishing player 1s. The mean minimum offer that would not be punished was 11 percent (for more in-depth analysis of TPG MinAOs, see Marlowe 2009, n.

5). In a correlation, the only variable that predicted the minimum offer that would not be punished was camp population ($r = 0.482$, $p = 0.011$, N = 27), with those in larger camps more readily punishing low offers. Camp population was also a significant predictor after controlling for the same four control variables used in all linear regressions. Sex, education, and household size were also significant predictors (table 6.6). The greater likelihood of punishment in larger camps in the TPG seems to match the greater tendency to reject low offers in larger camps in the UG.

TABLE 6.4 *Linear Regressions of Hadza Third-Party Punishment Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	0.96				
	(3.96)				
Female	−5.16	−5.41			
	(15.31)	(14.94)			
Education	0.70	0.50	0.30		
	(4.18)	(4.01)	(3.90)		
Individual income (U.S. dollars)	—	—	—	—	
Household wealth (U.S. dollars)	—	—	—	—	
Household size	−3.83	−3.78	−4.07	−4.10	
	(4.09)	(4.00)	(3.84)	(3.74)	
Head of household	6.86	6.79	11.50	11.66	13.69*
	(15.64)	(15.30)	(7.92)	(7.47)	(7.27)
Constant	29.68	31.87*	27.12***	27.23**	18.18***
	(19.37)	(16.76)	(10.26)	(9.96)	(5.60)
Observations	27	27	27	27	27
Model significance	0.510	0.365	0.234	0.113	0.071
Adjusted R-squared	−0.023	0.021	0.058	0.097	0.089

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

In 1998 DG and UG offers were significantly higher in larger camps. Camp population was not a significant predictor this time, but when the 2002 results are combined with those of 1998, offers are significantly higher in larger camps in both the DG ($r = 0.335$, $p = 0.004$, N = 74) and the UG ($r = 0.321$, $p = 0.003$, N = 86). Figures 6.7 and 6.8 show offers against camp population divided into small (16 to 20), medium-sized (24 to 42), and large camps (76 to 134).

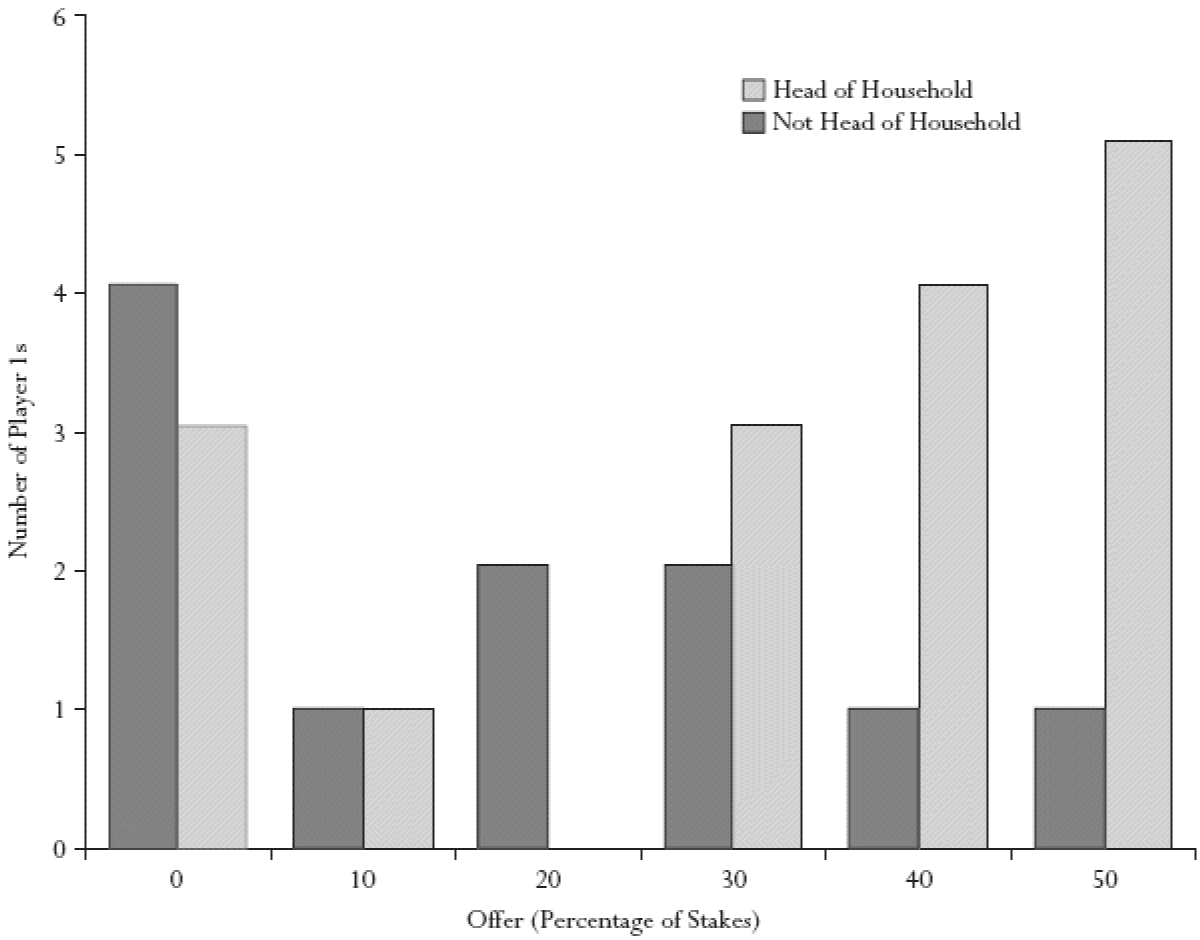
DISCUSSION AND CONCLUSIONS

The 2002 results largely reaffirm those in the 1998 DG and UG. Player 1s made low offers in the DG and UG. They made low offers in the TPG as well. Player 2s again rejected low offers, even more than in 1998, perhaps owing to the strategy method, as the Hadza just seemed more willing to reject the range of possible offers than the one real offer they were made in 1998.

As a result of low offers and high rejection rates, group earnings for the Hadza as a whole were low in the UG. But player 1s played sensibly. In all three games, the modal offer was the income-maximizing offer. Of course, this is a risky strategy in the UG, given that so many player 2s rejected low offers and many player 1s got nothing. Still, many player 1s maximized their earnings, more so than participants in most of the societies tested.

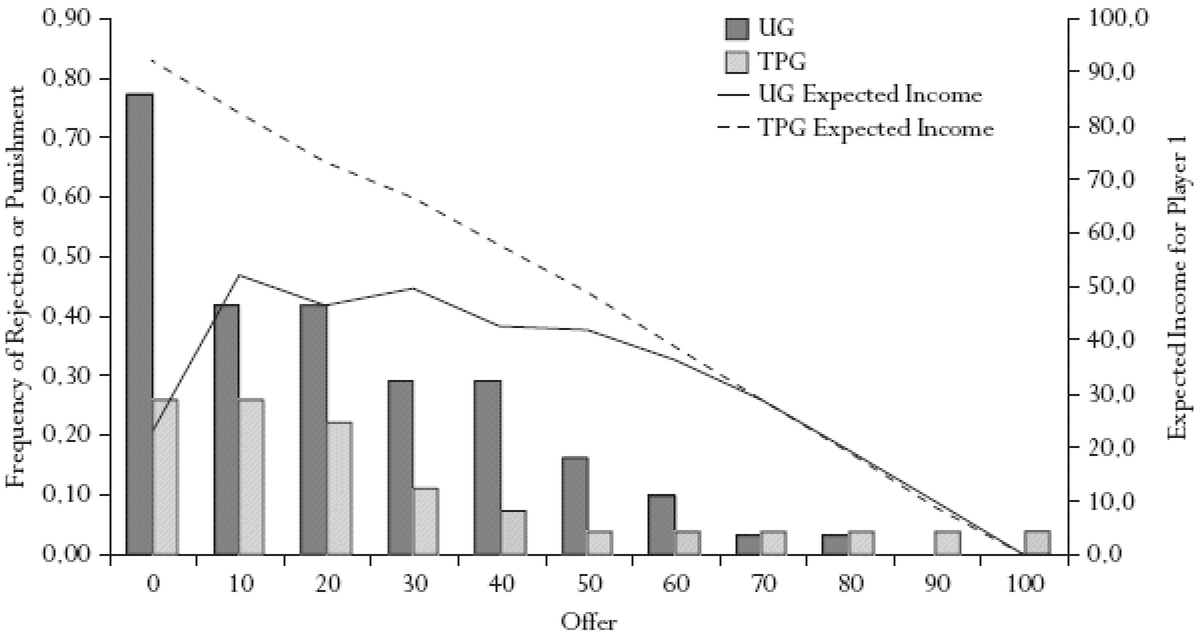
In the 1998 games, there was a higher rate of rejection in large camps (Marlowe 2004a), which may explain why people made higher offers in larger camps. Consistent with the 1998 results, people in this round had higher minimum acceptable offers in larger camps. In addition, even though the Hadza were not very likely to punish third parties, they were more likely to do so in larger camps. These results imply that the Hadza should give higher offers in larger camps, which is just what they did in 1998, though they did not do so this time. There is more bickering in large camps, which seems to be related to more persistent demands to share food in large camps, where the number of free-riders is absolutely greater (Marlowe 2004b). It could be that, even if it is more tempting to hoard food in larger camps, it is more costly to do so where there are more people to claim shares. This could explain why people felt compelled to make higher offers in 1998, but since offers were not higher in larger camps in any of the three games in this round, it is difficult to make that argument. Since offers in the DG and UG were higher in larger camps when combined with the 1998 round, the offers in 2002 were at least in line with the population effect in 1998. Perhaps there is too little spread in camp population to reveal any effect in 2002.

FIGURE 6.5 *Hadza Third-Party Punishment Game Offers by Head of Household Status*



Source: Author's compilation based on author data.

FIGURE 6.6 *Expected Income for the Ultimatum Game and the Third-Party Punishment Game, Based on Rejection and Punishment*



Source: Marlowe (2009) reprinted with permission.

TABLE 6.5 *Linear Regressions of Hadza Ultimatum Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	0.354				
	(4.68)				
Female	6.93	6.96			
	(10.27)	(10.06)			
Education	2.79	2.80	1.80		
	(4.78)	(4.69)	(4.41)		
Individual income (U.S. dollars)	—	—	—	—	—
Household wealth (U.S. dollars)	—	—	—	—	—
Household size	0.874	0.933	1.09	0.94	
	(4.80)	(4.65)	(4.59)	(4.51)	
Village (camp) population	13.34**	13.43**	14.26**	14.23**	13.93***
	(5.72)	(5.47)	(5.29)	(5.21)	(4.92)
Constant	−3.79	−3.15	−1.95	−0.43	2.01
	(18.28)	(15.91)	(15.66)	(14.98)	(9.19)
Observations	31	31	31	31	31
Model significance	0.210	0.122	0.075	0.032	0.008
Adjusted R-squared	0.084	0.119	0.136	0.162	0.190

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

TABLE 6.6 *Linear Regressions of Hadza Third-Party Punishment Game Minimum Nonpunished Offers*

Variable (Divided by Standard Deviation)	(1)	(2)
Age	−2.26	
	(4.97)	
Female	−16.78*	−16.84*
	(8.41)	(8.26)
Education	−8.25*	−7.55*
	(4.20)	(3.84)
Individual income (U.S. dollars)	—	—
Household wealth (U.S. dollars)	—	—
Household Size	7.24	7.00*
	(3.85)	(3.74)
Village (camp) population	11.82**	13.10***
	(5.18)	(4.10)
Constant	−2.09	−9.80
	(20.29)	(10.92)
Observations	27	27
Model significance	0.033	0.016
Adjusted R-squared	0.279	0.305

Source: Author's calculations based on author data.

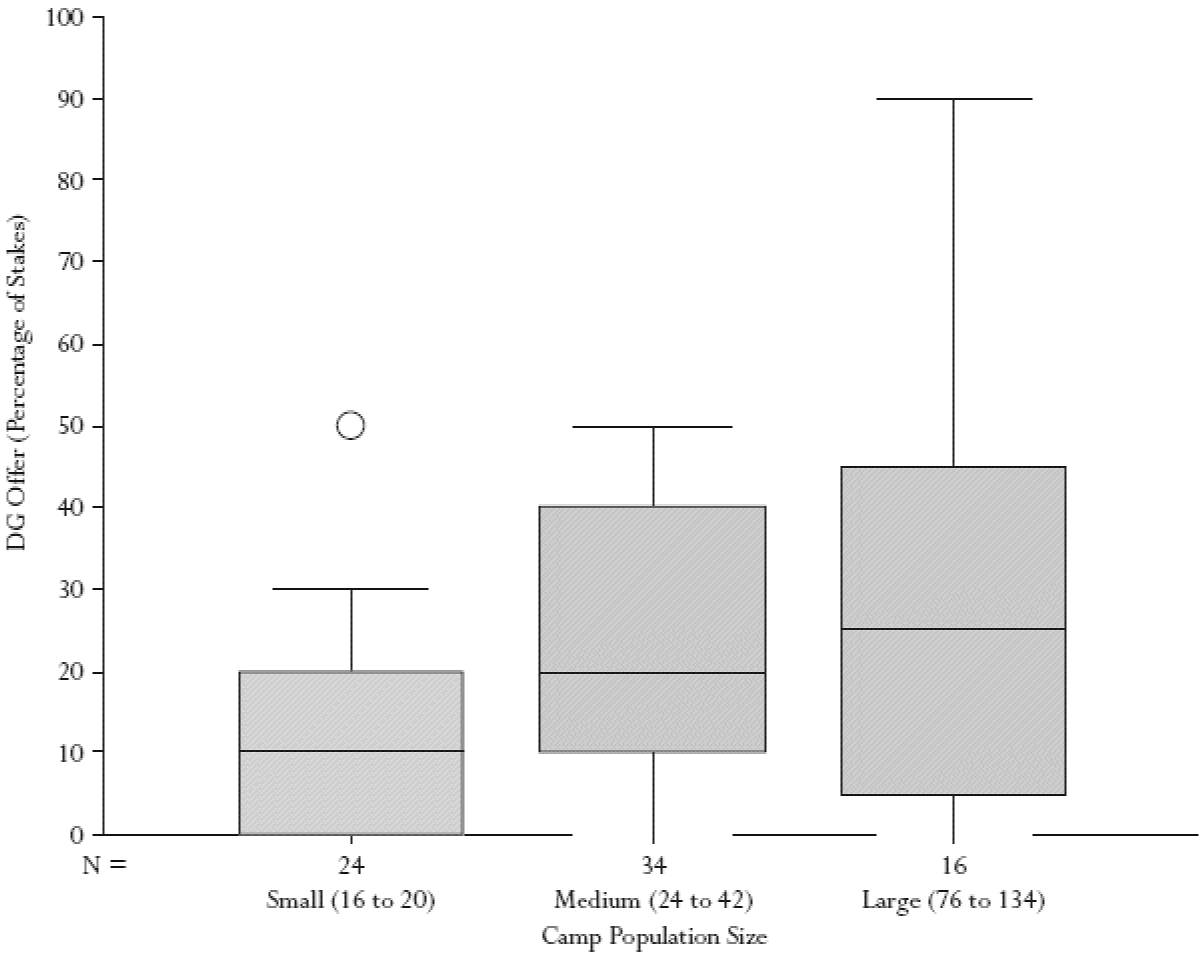
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

FIGURE 6.7 *2002 Dictator Game Offers Combined with 1998 Dictator Game Offers*

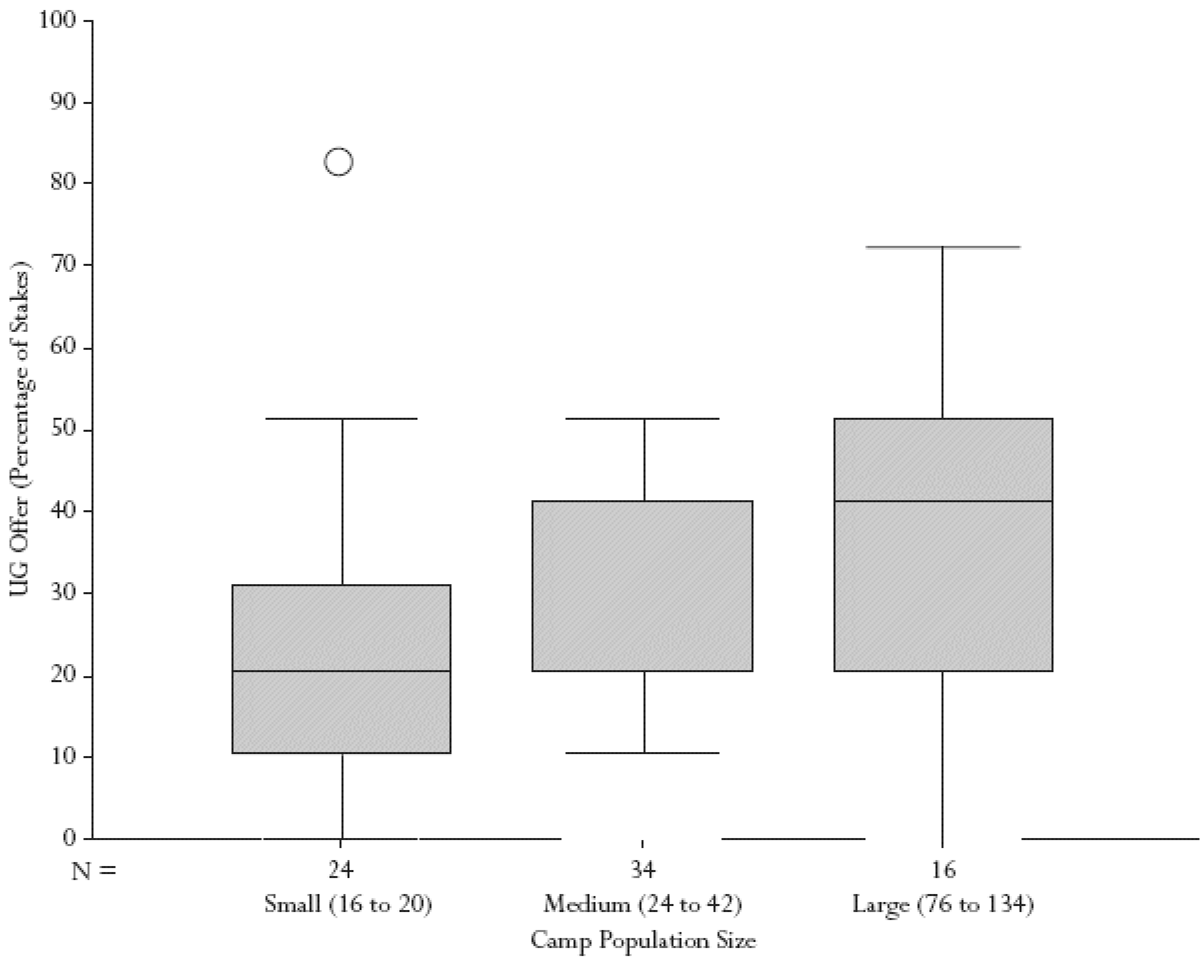


Source: Author's compilation based on author data.

The Hadza share food every day, yet they gave low offers in all three games. Although they were willing to reject low offers in the UG, they were not inclined to punish someone who gave someone else a low offer. The way the Hadza play these games suggests that solving collective-action problems is difficult for them. If they had not made low offers or rejected low offers, then, as a group, the whole camp would have gotten a lot more money from me and therefore would have maximized the group benefit—even if that had come at the expense of some individuals. Any rejection meant that I kept the money I would have given to one or both of the two players. The Hadza often have difficulty maintaining a concerted effort to keep their agro-pastoralist neighbors out of their area because as soon as they finish agreeing among themselves to do just that, some individuals go

right out and beg from, or trade with, an agro-pastoralist neighbor, undercutting Hadza solidarity. Strong reciprocity based on third-party punishment helps enforce cooperation by all, but the Hadza do not often punish third parties, only those who have slighted them directly. Most player 3s could not figure out why they would punish player 1, and those who did punish seemed to think they might somehow get money back. Once I stressed that they would not, almost all of them refused to punish. This tendency squares with my observations and interviews. When I ask Hadza what they will do if someone is being a slacker or being stingy, the most common answer is, “We move away from them,” rather than, “We make them leave.” They are averse to confrontations and solve most conflicts with others by moving, which is what they do when someone in camp is trying to boss them around.

FIGURE 6.8 *2002 Ultimatum Game Offers Combined with 1998 Ultimatum Game Offers*



Source: Author's compilation based on author data.

The Hadza do engage in reciprocity, both with me and with each other. But just as we often think it bad form to keep close tabs on the balance of favors, so too do the Hadza. In fact, it seems to be the overriding ethic. In a stratified society with wealth disparities, like most complex societies, we might expect the poor to argue for the rich to share more of their wealth and to feel no need to repay the rich. Since there will always be a small number of people at the top, we might expect the ethical norm that serves the interests of the many on the bottom to spread. But what should we expect in an egalitarian society without wealth like the Hadza? There are probably more occasions in a camp of thirty to forty people when even the best hunter does not have any food and someone else does. Therefore, it will often be in his interest to demand shares from others. The same cannot be

said of women, who target more predictable foods. Their food returns depend more on effort and strength or stamina than luck (Blurton Jones and Marlowe 2002). Women appear to share their food more within the household and with close kin who remain in camp to look after their weanlings (Marlowe 2006) than with other households. Despite these sex differences, however, sex was not a significant predictor of offers.

Household heads gave higher offers in all three games. All player 1s were the same people in the DG and UG, so this is no more surprising than the correlation between offer amounts in those two games. However, only about half (thirteen of twenty-seven) of player 1s in the TPG were player 1s in the DG and UG. Thus, it appears that there is something meaningful about being the head of a household when it comes to giving. Perhaps being the head of a household means that one simply must get used to giving food to one's children and mate. Even if household heads would prefer to keep a larger share, perhaps for them the game more strongly triggers an obligation to give. This result was produced, however, largely by women who were not household heads, and in reality they are giving food to their children every day, though a smaller fraction of their food tends to go outside the household than men's.

Tit-for-tat (TFT) is a good strategy for promoting cooperation, even if other strategies are better at maintaining it, at least in a prisoner's dilemma game (Axelrod 1984; Nowak and Sigmund 1993). Daily food-sharing might be one of the most ancient forms of human cooperation. In the TFT strategy, the first move is to *cooperate.* Therefore, if TFT captures Hadza norms in any situation where they have to decide whether to give to another or not (even in a one-shot, anonymous game that is alien to them), we might expect them to cooperate in the role of player 1. An understanding of what constitutes cooperation (full cooperation anyway) by the giver and receiver in the UG should converge on a convention of a fifty-fifty split of the stake, since it is difficult for anyone to argue that an equal split is unfair. We might therefore expect Hadza player 1s to give 50 percent in these games. Instead, they gave much lower offers. Thus, reciprocity based on a tit-for-tat strategy seems a poor explanation for the ubiquitous food-sharing among the Hadza. Of course, money is not food, and these games are not food-sharing. But it is precisely because money is not food that we gain insight. Money can be hidden and thus does not have to be shared, while food usually cannot be

hidden. When certain foods can be hidden, the Hadza will often do just that, sneaking them into their household.

Except for their rejection of low offers, the Hadza come pretty close to the expectations of rational choice theory. For example, the modal offer of player 1s in all three games was the income-maximizing offer. It is their rejection of low offers that seems irrational. But surely we can understand them being disappointed with low offers and wanting more. Something is not necessarily better than nothing when others gain a relative advantage. It is the "something is better than nothing" principle in rational choice theory that is called into question by an evolutionary, relative fitness perspective.

In conclusion, the 2002 games reaffirm some results from the 1998 round. Hadza players gave low offers in all three games and rejected low offers from other players. Women continued to give slightly lower offers than men, but again, the difference was not significant. On the other hand, there were no correlations with camp population this time, although offers were higher in larger camps when combined with the 1998 results. Lastly, the Hadza were not very willing to incur a cost to punish third parties, calling into question the cross-cultural universality of strong reciprocity. To understand why the Hadza played the way they did, all we need to do is consider that self-regarding people without wealth, and in the absence of environmental constraints, should not want to share with others but should want others to share with them, and they should not want to pay to punish those who cheat third parties to whom they are not related. That is what an evolutionary perspective tells us to expect. "It is better to give than to receive" is an aphorism that may have been designed to make others think we are generous and get them to give to us (Marlowe et al. 2011).

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NOTES

1. Richard McElreath used 1,000 rather than 2,000 Tanzanian shillings, but I needed to use ten 200-shilling coins to make it easier for Hadza and 100-shilling coins had been discontinued. A day's wage has little meaning among the Hadza anyway.

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Chapter 7

Cruel to Be Kind: Effects of Sanctions and Third-Party Enforcers on Generosity in Papua New Guinea

David P. Tracer, Ivo Mueller, and Jennifer Morse

Perhaps nowhere in the world is the norm of generosity more pronounced than in Melanesia. Whereas purchase, via either money or barter, tends to be the dominant mode of resource acquisition in much of the world, apart from self-generated production, the generosity norm manifested primarily through gift-giving operates to provide people in most Melanesian societies with many of their resource needs (Sillitoe 1998). In some cases, the generosity norm dictates obligatory exchanges necessitated by ceremonial occasions that are highly structured in form and value; in others, the exchanges are unsolicited and variable with respect to time, place, and value.[1] Regardless of form, Paul Sillitoe (1998) argues, the norms of generosity and gift-giving are so pervasive and intrinsic to the basic social, political, and economic structure of Melanesian society that individual acts of "gift-giving" should instead be referred to as "sociopolitical exchange."

The origin and maintenance of generosity norms, however, is problematic. In neoclassical economics, the central discipline concerned with understanding the basis of resource exchange, individuals are expected to be hyper-rational—to have knowledge of not only their own preferences ("utility functions") but those of all others with whom they interact (Young 1998). Moreover, given this knowledge, individuals are expected to exhibit exchange strategies that are utility-maximizing for themselves—that is, to use those strategies that maximize their personal payoffs (Kreps 1990). Indeed, the notion that people exhibit "self-regarding selfishness" (Tracer 2003) underlies the "Nash Equilibrium" in game theory—the fundamental concept that the optimal solution to any "game" (n-person exchange situation) is reached when all participants are playing a strategy such that

no individual can further increase his or her payoff by changing it unilaterally (Camerer 2003). The notion that exchanges are n-person games in which each person selfishly attempts to maximize payoffs at the expense of others would seem, at face value, to preclude the idea that individuals would ever behave according to a norm of generosity—providing for others, either in solicited or unsolicited fashion, at a cost to themselves.

Apart from economics, the discipline of anthropology is also concerned with the establishment and maintenance of social norms, and for anthropology the existence of prosocial generosity norms is no less problematic. In place of the Nash Equilibrium, rigorous anthropological models of behavior are based on the concept of the evolutionarily stable strategy (ESS), a dominant strategy that cannot be supplanted by any invading alternative strategies given that others do not change their strategies (Maynard Smith 1982). The modeling of prosocial behaviors has shown that cooperation (as well as altruism and generosity) can be sustained as an ESS where groups are strongly kin-based and thus individuals have a high coefficient of relatedness ("kin selection" models) (Hamilton 1964) or where repeated interactions are likely ("reciprocal altruism" models) (Axelrod and Hamilton 1981; Trivers 1971). An alternative model of cooperation as a form of signaling that, by virtue of its costliness, is honest and thus serves as an indicator of worth as a mate or partner in future interactions has also recently been shown to be potentially evolutionarily stable under certain conditions (Gintis, Smith, and Bowles 2001). Ernst Fehr and Simon Gächter (2002) maintain that none of these explanations can fully account for the pervasiveness of human beneficence since it is seen to occur in situations where individuals are unrelated, where individuals are unlikely to meet repeatedly, or where signaling or reputation effects are negligible. Although the former two situations clearly do occur, it is unclear under what conditions reputation effects might be negligible. Nonetheless, the evolution and maintenance of a generosity norm remains not fully explained according to many of the dominant models employed within anthropology.

Another possible explanation for the evolution and maintenance of generosity norms in human groups is that violators of the norm are sufficiently sanctioned or punished for noncompliance that it becomes more costly for individuals to violate the norm than to adhere to it (Henrich et al. 2006).[2] Costly punishment itself may evolve because of a combination of

benefits conferred on enforcers by their willingness to engage in an honest and costly signal of their preference for fairness coupled with the reputational effects they accrue as an individual who will neither be cheated nor take a “sucker's payoff” without retribution. The hypothesis that generosity norms are maintained by sanctions and enforcers is consistent with the neoclassical economic and evolutionary propositions that individuals are self-interested utility-maximizers whose basic nature is to be noncooperative whenever possible (Kendal et al. 2006).[3] It also leads to the testable prediction that in cases where sanctions or enforcers are absent or the punishments imposed for norm violation are sufficiently small such that they do not offset the advantages of behaving noncooperatively, individuals will defect from the cooperative strategy.

To test the proposition that generosity is maintained by sanctions and punishments, we carried out a series of economic experiments in a remote region of Papua New Guinea, an area that, like other parts of Melanesia, has a pervasive and strong generosity norm. The series of experiments consisted of: (1) the dictator game (DG), an experiment that tests for individuals' propensities to be altruistic and in which individuals cannot be sanctioned for behaving selfishly; (2) a strategy method ultimatum game (UG), in which one member of a bargaining dyad may be punished by the other member of the dyad, albeit at a cost to the punisher, for behaving in the game in a manner reckoned as being unfair; and (3) a third-party punishment game (TPG), in which a third-party “enforcer” may punish (at a cost to him- or herself) a member of a dyad for dividing a sum between him- or herself and the other member of the dyad in a manner perceived by the enforcer to be unfair. According to the notion that individuals are basically selfish and the hypothesis that the generosity norm is maintained by sanctions and enforcers, we would expect individuals to behave more selfishly in the dictator game than in either of the two games in which punishment for noncooperation is possible. In addition, the hypothesis that adherence to a generosity norm is perpetuated by enforcing sanctions and punishments implies that there must exist a corollary norm dictating that individuals who are able to punish noncooperators should in fact do so. The propensity of people to punish those perceived as behaving selfishly is also examined in this study using the ultimatum and third-party punishment games. Finally, data from previous economic experiments carried out in Papua New Guinea (Tracer 2004) and elsewhere (Eckel and Grossman

1998; Ensminger 2004; Henrich et al. 2001) suggest that demographic variables, such as gender, and measures of market integration, including wealth and income, may exert a direct influence on offer amounts. Consequently, the effects of a roster of proxy measures of market integration and personal and household wealth on offer amounts are investigated here as well.

ETHNOGRAPHIC BACKGROUND

The experiments reported here were conducted among the Au people of Papua New Guinea, a group among whom the first author has been working for twenty-five years. The name Au refers to the principal language spoken in the region by approximately 10,000 inhabitants of roughly fifty villages ranging in size from fewer than 100 to almost 500 individuals, with a mean village size of approximately 280 persons. The dictator and ultimatum games were carried out in Weis, a village of 300, and the third-party punishment game in Wulukum, a village of 350 people. The former village is quite remote, being roughly five hours by foot from Yangkok Mission Station, the nearest mission station (the site of the largest market as well as the central airstrip in the area), while the latter is only one and a half hours away and is more integrated into the social and economic life that revolves around the mission station. All individuals in these villages, as in most of contemporary Papua New Guinea, also speak Neo-Melanesian (Tok Pisin) the lingua franca of the country.

The area of study is located at 3 degrees 30 minutes south of the equator, roughly fifty kilometers inland from the northern coast of Papua New Guinea. It is hot, wet, and humid lowland tropical rain forest. Although there is one dirt track into the area from the midsized coastal town of Wewak, the overland route takes about eleven hours in a four-wheel-drive vehicle over terrain that is frequently blocked by fallen trees and brush or flooded and impassable. Transport to the area is therefore usually conducted by light plane, landing on a grass airstrip at the Yangkok Mission Station.

The Au are forager-horticulturalists subsisting primarily on starch extracted from semi-wild stands of sago palm, supplemented by tubers, fruits, leaves, and nuts collected from the rain forest or grown in small gardens prepared using slash-and-burn techniques. They also hunt wild game, the most common prey items being small marsupial mammals such

as bandicoot and phalanger (cus-cus); large animals such as wild pigs are taken much less often. Husbandry of pigs and chickens is also practiced, but these are considered prestige items and are seldom consumed except on ceremonial occasions. The Au construct gardens specifically for the small-scale cash-cropping of coffee, cocoa, and, most recently, vanilla. Despite the availability of at least some income through cash-cropping and, to a lesser degree, employment by local missionaries and government agencies, the area occupied by the Au has long been known as one of the poorest in Papua New Guinea, with rampant and chronic undernutrition, high infant and toddler mortality, and an average life expectancy at birth of only forty-three years for males and one year less for females (Sturt 1972; Tracer et al. 1998).

Despite living in an environment characterized by a chronic scarcity of resources, Au society, like other Melanesian societies, revolves around an elaborate system of obligatory and non-obligatory exchange relationships. Moreover, within the context of these exchange relationships, a premium is placed on generosity. For example, when a woman is betrothed to a man in another village, for a period of time she initially continues to dwell primarily in her natal village but visits her prospective husband's village periodically for several days at a time to work with his female kin. This period is essentially a trial period during which much union dissolution takes place. However, after it is deemed that she is a good fit for her husband and works well with his female kin, a portion of the bride-price is paid, and a “sending ceremony” is held: the bride formally leaves her natal village and is accompanied by a procession of villagers to the village of her husband. Along with the bride, her village sends gifts to the husband's village consisting, at minimum, of betel nut, sago starch, leaves traditionally used as plates, and coconuts. Although no specific amount of these items is specified, her natal village is supposed to be as generous as possible in its gift-giving; in addition to the aforementioned items, it is not altogether uncommon for the gifts to include store-bought commodities such as rice, canned meat, or fish. A parcel of gifts perceived to be less than adequate for the occasion might result in a dispute that if not resolved promptly could turn violent.

A successful pig kill is another occasion on which both obligatory and voluntary exchanges occur and generosity is valued. According to traditional Au values, a hunter is barred from consuming any part of his

own pig kill and must instead distribute shares to his and his wife's kin. Other villagers may be given shares at the discretion of the hunter or may specifically ask to be given a share. As in the previous example, the hunter is expected to be generous in doling out pig meat, and individuals who perceive themselves as having been slighted by receiving smaller-than-expected shares or none at all might retaliate against the hunter with a verbal assault or physical violence. In the 1998 field season, an alleged violation of the meat-sharing norm resulted in severe physical violence against the wife of the offending party.[4] Following the physical violence, ostracism continued, and within the year the man and his wife had been forced to flee his village and take up residence in the wife's natal village.

Apart from exchanges in the formal contexts of rites of passage and hunts, the Au also emphasize generosity in day-to-day relationships. Individuals who need specific items often make requests of other villagers (and sometimes of people outside the village) for those items, and the individuals of whom requests are made are expected to oblige. In 1989 David Tracer's wife made a traditional taanik, or string bag, for a prominent elder in the village in which we lived. He was quite proud to possess a bag woven by an American woman and carried it virtually everywhere. When Tracer returned several years later, he noticed that the man no longer carried the bag. When he inquired what became of it, fully expecting to be told it had ripped, he instead was informed that a distant relative from another village had passed through, seen the bag, and asked for it. “What could I do?” continued the elder. “I was obligated to give it to him.” Although low-value items such as betel nut and tobacco are by far the most common items requested, higher-value items such as meat, clothing, and metal tools—and string bags—are also sometimes requested. It is perhaps for this reason that the Au tend to be discreet about their possessions and not talk about them too much. Although the right to request and the obligation to give are ubiquitous norms recognized by the Au, they also recognize that the right to request must not be abused. Individuals who are viewed as making too many frivolous requests may be shunned or ostracized.

Unsolicited gift-giving is also an important part of Au village life. The giving of an unsolicited gift generates prestige for the giver and incurs a debt for the recipient. Although the debt is not explicit and is not required to be paid back in kind, by accepting the gift, the recipient implicitly acknowledges an alliance relationship with the giver and is expected to

reciprocate in the future if asked for help. Help may be sought in such contexts as hunting or house-building, or in disputes. Thus, as noted by Marshall Sahlins (1972, 133), generosity may place such severe constraints on others that, as an Inuit proverb says, "'Gifts make slaves.'" As such, among the Au, unsolicited gifts are sometimes rejected by potential recipients who may either perceive the ensuing debt as unmanageably large or fear forming an alliance with someone with undesirable qualities, such as a person seen as overly belligerent. An ultimatum game conducted by Tracer (2003) in the villages of Anguganak and Bogasip produced results that seemed to reflect both a valuation of the norm of generosity and fear of overly large unsolicited gifts: recipients rejected both very low offers (20 percent of the stake or less) and hyper-fair offers (greater than 50 percent of the stake) more than 50 percent of the time.

METHODS

The dictator and ultimatum games were carried out at Weis Village and the third-party punishment game at Wulukum Village. Scripts explaining the games were prepared in Neo-Melanesian by the first author and back-translated into English by Mr. Sakawi Meku of Anguganak Village. Some minor adjustments to the script were made during the back-translation process.

The first and third authors arrived at the villages one day prior to the scheduled game day in order to announce that a research project would be conducted the following day. It was explained that the project involved playing something that was akin to a game but was in fact research. It was further explained that participation in the research was completely voluntary and that participants would be compensated for their time with a show-up fee of 2 kina and the opportunity to earn an additional payoff. Individuals were also told that, if they chose to participate, they should be prepared to remain at the research site all day, as the project was fairly time-consuming. To avoid further discussion among participants and the possibility of collusion, no details of the games were given during the prior day's announcement.

The dictator and ultimatum games were conducted at Weis Village using thirty pairs of subjects on a single day over the course of approximately thirteen hours. The stake for each game was 10 kina, a midlevel single day's

wage for unskilled labor.[5] The games were conducted in a secluded room that normally served as a birthing chamber, under one of the village houses. Prior to entering the room, each participant was interviewed to collect basic demographic data as well as information on wealth, income, and proxy measures of market integration. The variables collected were:

1. Birth year
2. Sex
3. Years of formal schooling
4. Marital status
5. Number of offspring
6. Religion
7. Frequency of attendance at religious services (per month)
8. Fluency in the national language (“none,” “some,” “fluent”)
9. Individual annual income
10. Estimated total household wealth
11. Percentage of household diet derived from market goods
12. Annual income from wage labor, rentals, and trade
13. Frequency of wage labor in the past month
14. Number of trips to market in the past month
15. Frequency of purchasing goods for resale in the past month
16. Animal wealth possessed (in animal units and monetary value)
17. Land wealth possessed (in hectares and monetary value)
18. Hectares of land devoted to annual subsistence cropping
19. Hectares of land devoted to annual cash-cropping

However, the present analysis uses only a subset of these variables.

After individuals entered the room, they were given their show-up fee of 2 kina and the standardized script was used to explain each game to them.

In addition, during the explanation ten 1-kina coins lined up on a cloth were manipulated and used to illustrate the options open to the proposer (player 1) and recipient (player 2) in each game. Following the explanation of each game, participants were given the chance to ask any questions they may have had about it. A testing period then commenced, during which individuals were presented with different scenarios of offer amounts and, for the ultimatum game, acceptance or rejection of those offers; they were asked to identify the amount that player 1 and player 2 would take home in each instance. Individuals who incorrectly answered test questions were given additional questions to answer. The number of test questions given varied from 5 to 12, with a mean number of 6.9 in the dictator game and 6.0 in the ultimatum game.

The dictator game was conducted first among all thirty pairs of participants, followed by the ultimatum game. Participants kept the same role in both games (that is, as either player 1 or player 2); however, they understood that they would be paired up with different people playing the opposite role in each of the two games. Payoffs to the participants were disbursed at the end of the thirteen-hour day of game play. Because the game day lasted longer than expected, exit interviews during which participants were asked why they had played the game as they did and whether they had any other comments about the game were administered only to a sample of twelve players.

The third-party punishment game was played at Wulukum Village during a single day lasting approximately ten hours. The game was played with an allotment of 10 kina to player 1 and player 2 and 5 kina to player 3 (the punisher). In contrast to the previous games, and owing to the complexity of the TPG, we conducted an initial explanation meeting with the participants as a group, using a prepared back-translated script. Members of the group were asked to neither comment on the game nor ask any questions during this group explanation. Following the group explanation, the game was conducted in a secluded structure that the village used as a small church. An interview was again conducted with each participant before he or she entered the structure, to collect basic demographic data as well as information on wealth, income, and proxy measures of market integration. As individuals entered the structure to play, they were paid a 2-kina show-up fee and the game was explained to them a second time. They were then given the opportunity to ask clarifying

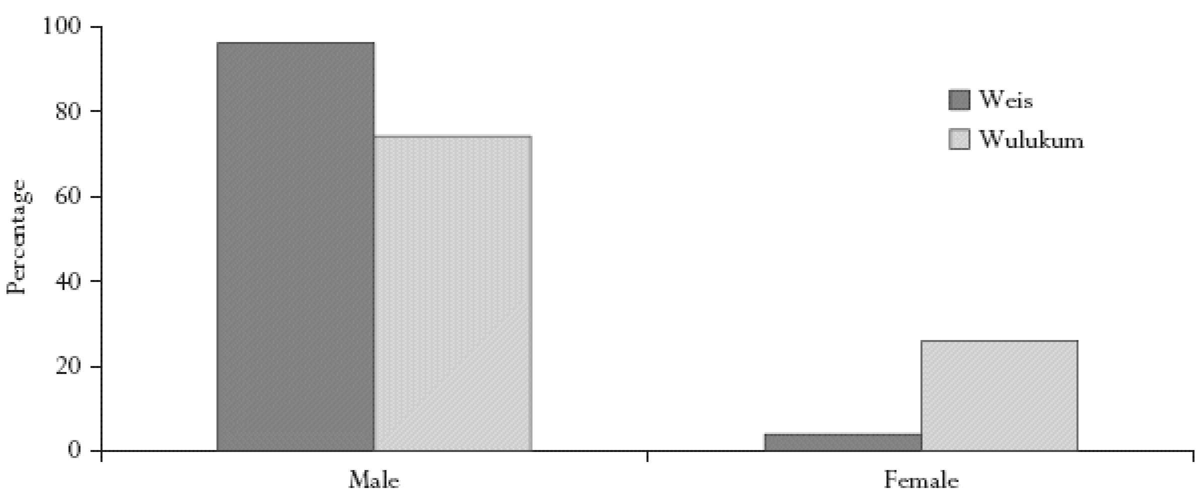
questions, followed by a period of testing. The average number of test questions administered was 10.1. In total, thirty player 1s, twenty-five player 2s, and thirty player 3s participated in the experiment. Five player 2s were thus given two offers at the end of the game. This is not at all problematic, since it is player 1s and player 3s who are active “decisionmakers” in the third-party punishment game. Player 2s are essentially “inert” participants who are merely awarded their endowments at the end of the game on the basis of the actions of the player 1s with whom they are paired.

RESULTS

Sex, Age, and Household Size

The sex distributions of the samples at Weis and Wulukum are shown in figure 7.1. The sample used for the dictator and ultimatum games at Weis (N = 60) was 95 percent male and 5 percent female. The Wulukum sample (N = 85) for the third-party punishment game was 74 percent male and 26 percent female. Although it was announced that both males and females could participate—and indeed a mix of male and female was encouraged—the males of both villages dominated the sample.

FIGURE 7.1 *Comparison of Gender Distribution of the Samples at Weis and Wulukum*



Source: Authors' compilation based on author data.

Age could be definitively assessed for only 28 percent of the sample (N = 17) at Weis and 71 percent of the sample (N = 60) at Wulukum. The mean age of the participants at Weis was 36.2 years, and at Wulukum it was 38.4 years. The difference between the villages was not significant (two-tailed *t*-test, $p = 0.51$). Age is omitted as a variable in all further analyses since its inclusion would significantly reduce sample sizes.

Figure 7.2 shows a comparison between the Weis and Wulukum samples of the distribution of household size. Household size at Weis ranged from 1 to 11 persons, with a mean of 5.4 persons. At Wulukum, household size ranged from 1 to 10 persons, with a mean of 5.6. The difference between the villages was not significant (two-tailed *t*-test, $p = 0.20$). The most common household structure in both villages consisted of the game player, a spouse, and their dependent offspring.

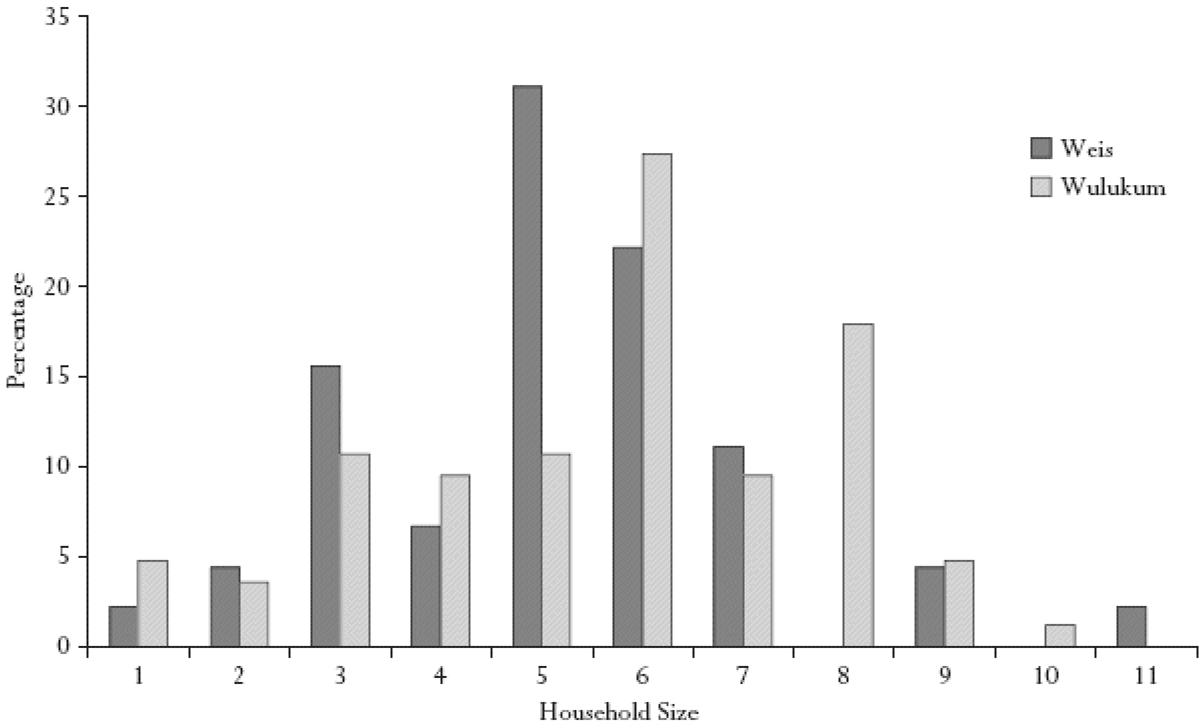
Educational Attainment, Religious Attendance, and Fluency in the National Language

Figure 7.3 compares the Weis and Wulukum samples in the distribution of educational attainment, in years. The focal points of zero and six years reflect the fact that in Papua New Guinea many parents choose not to send their children to school, but among those who do, primary schooling proceeds until grade six. Overall, the Wulukum sample is slightly better educated than the Weis sample, with an average of 3.7 versus 2.6 years of schooling. The difference, however, does not quite reach the level of statistical significance (two-tailed *t*-test, $p = 0.06$).

Figure 7.4 shows the frequency of attendance (times per month) at Christian church services at the two villages. Each village has several bush material churches located in several of its hamlets; however, Wulukum is an active center for the “Christian Revival” sect in Papua New Guinea and also has a large church made of sawn timber with a corrugated sheet metal roof. One can easily get the impression from being in the two villages that religious life is much more central at Wulukum than it is at Weis. Indeed, as shown in figure 7.4, the percentage of the sample who never attended church services was much higher at Weis than at Wulukum (83 percent versus 39 percent), and none of the sample at Weis attended services twice per week, whereas 55 percent of the sample at Wulukum did. Overall, the mean monthly frequency of attendance at religious services was

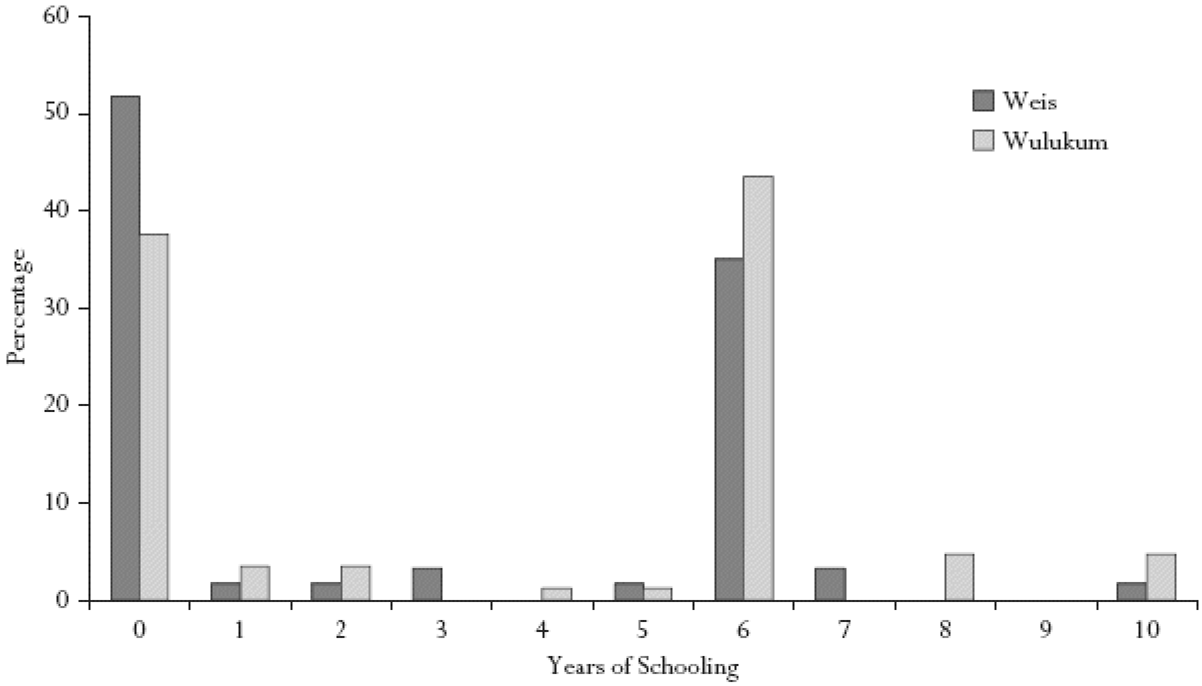
significantly different between the villages, with a frequency of 0.4 at Weis and 4.6 at Wulukum (two-tailed *t*-test, $p < 0.0001$).

FIGURE 7.2 *Comparison of Household Size of the Samples at Weis and Wulukum*



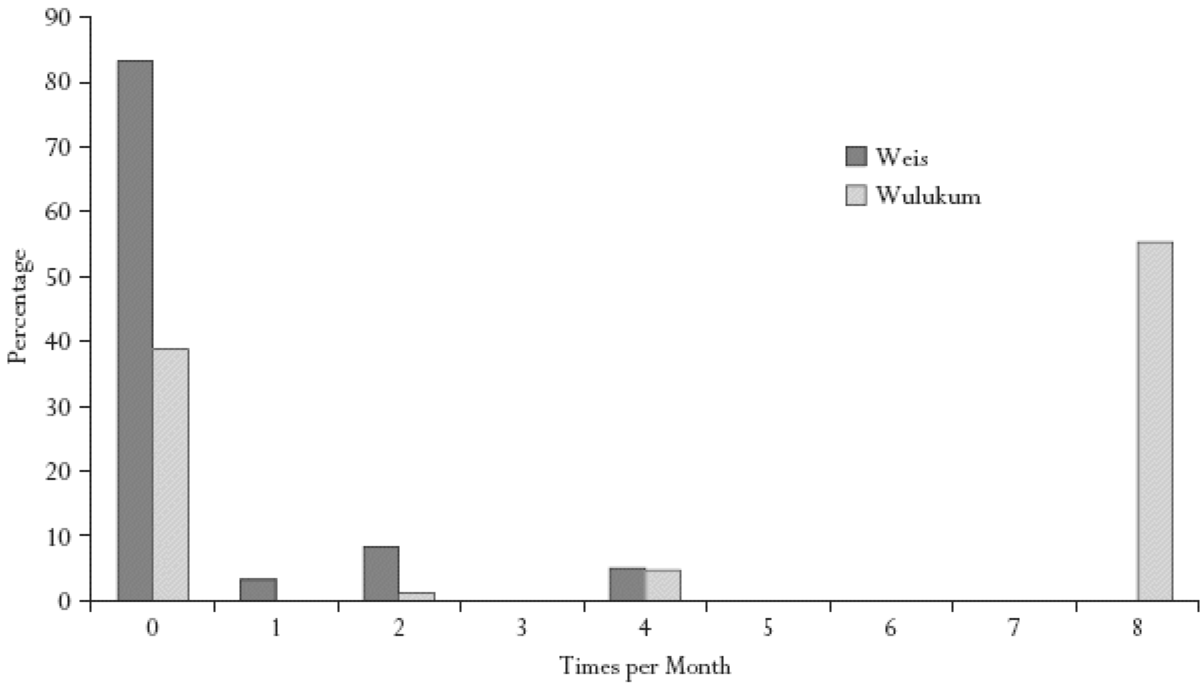
Source: Authors' compilation based on author data.

FIGURE 7.3 *Comparison of Educational Attainment of the Samples at Weis and Wulukum*



Source: Authors' compilation based on author data.

FIGURE 7.4 *Comparison of Frequency of Attendance at Christian Religious Services at Weis and Wulukum*



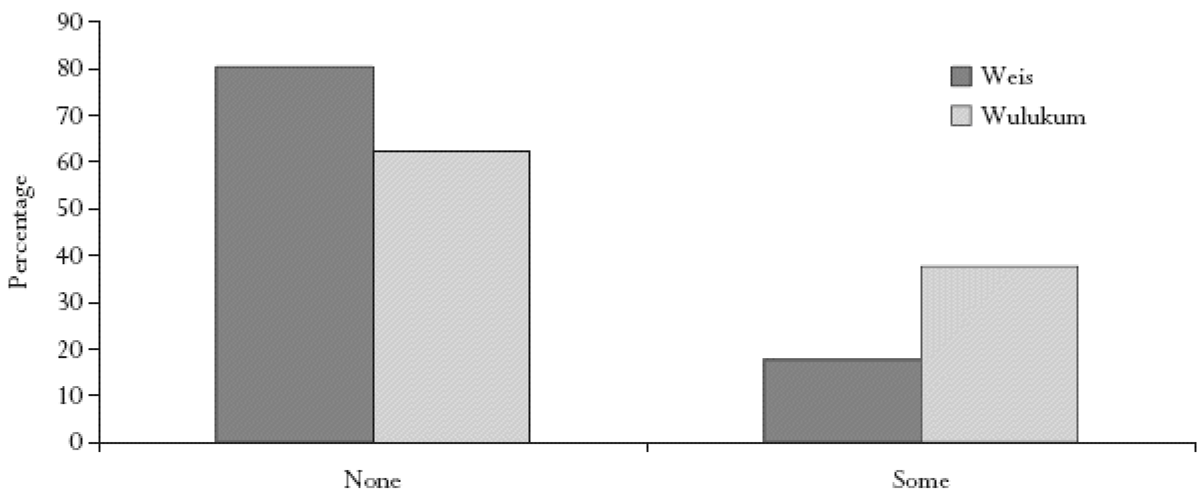
Source: Authors' compilation based on author data.

Although the official national language of Papua New Guinea is English, most local (and sometimes national) discourse within the country is carried out in the lingua franca, Neo-Melanesian, and only a small proportion of the nationwide populace is fluent in English. As shown in figure 7.5, at Weis, 80.4 percent of the sample reported no proficiency in English, while 17.6 percent reported some. At Wulukum, 62.4 percent of the sample reported no knowledge of English, while the remaining 37.6 percent reported some. The greater proficiency in the national language at Wulukum compared to Weis is undoubtedly a product of the village's higher educational attainment, as most English is learned in community schools. In addition, the greater proximity of Wulukum to the mission station, with its predominantly English-speaking missionaries, may also contribute to the greater reported knowledge of at least some English in that village. It is worth noting, however, that in neither village can communication with villagers be accomplished solely in English.

Income, Wealth, and Indices of Market Integration

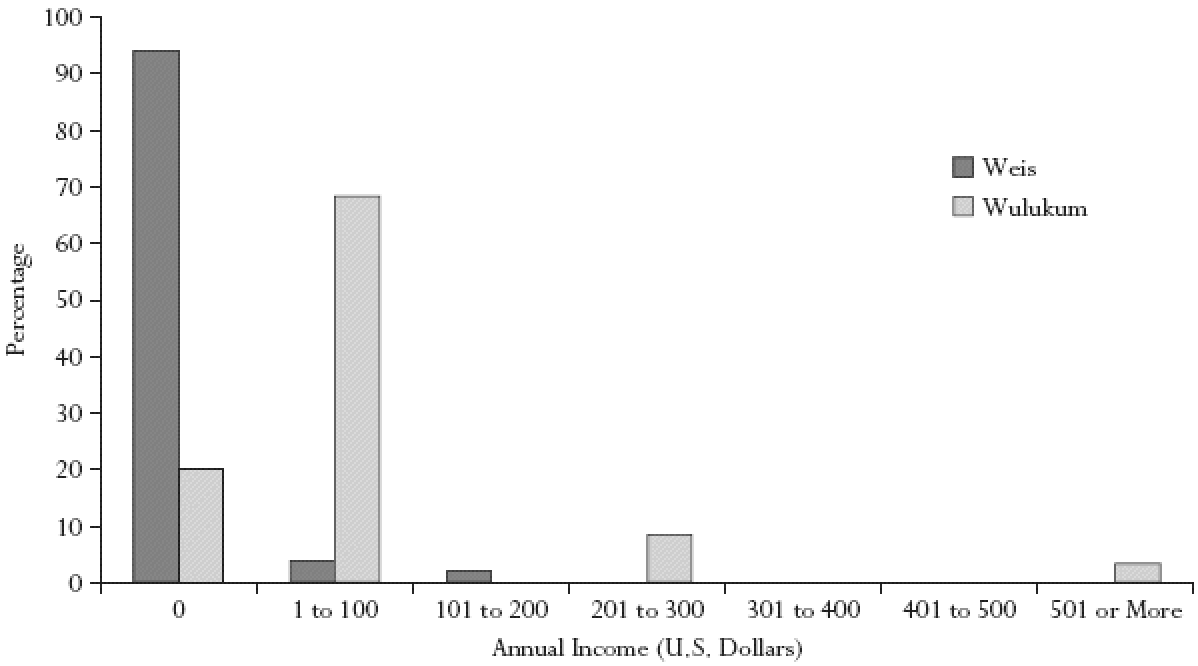
Individual annual income in the two villages, converted from Papua New Guinea kina to U.S. dollars, is shown in figure 7.6. For most Au people, income is derived from the sale of cocoa and, to a much lesser extent, home produce. Income in the total sample ranged from $0 to just over $1,200, with a mean of $41. A full 57.5 percent of the total sample reported no cash income whatsoever in the preceding year. Again, being closer to the mission station and airstrip, the people of Wulukum have a greater opportunity for commerce than those at Weis, and this is reflected in the extreme difference in average individual income between the villages. Mean reported income at Weis was $2.98, versus $80.25 at Wulukum (two-tailed *t*-test, $p = 0.001$).

FIGURE 7.5 *Comparison of Proficiency in the National Language (English) at Weis and Wulukum*



Source: Authors' compilation based on author data.

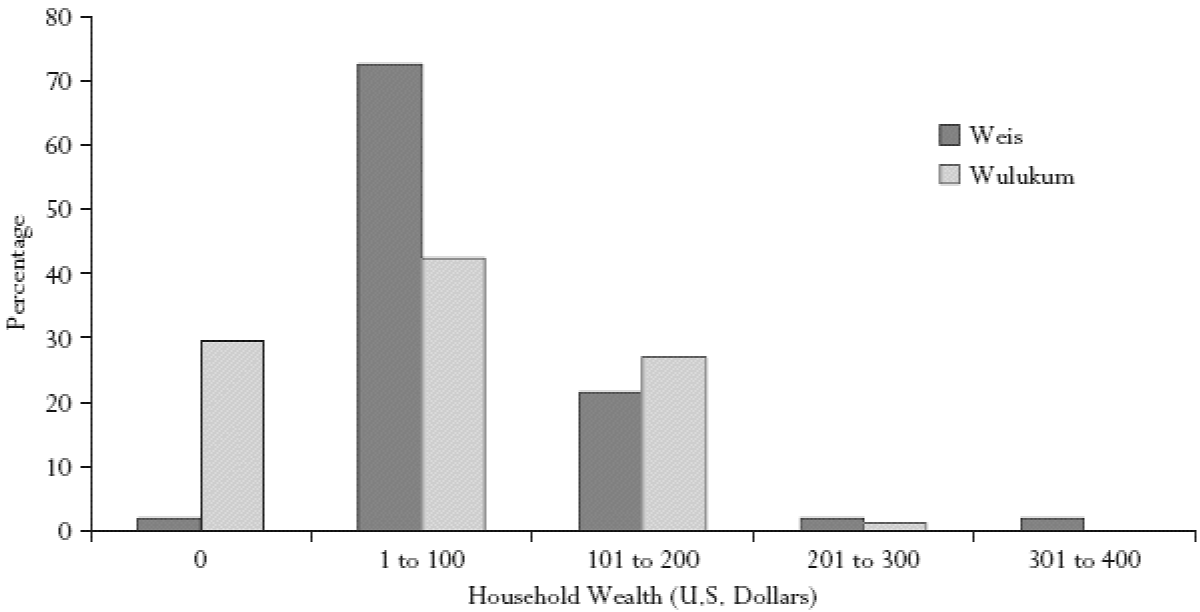
FIGURE 7.6 *Comparison of Annual Income of Individuals at Weis and Wulukum*



Source: Authors' compilation based on author data.

Household wealth, mostly derived from animal holdings (predominantly pigs and chickens) and land wealth, is shown in figure 7.7. It ranged from $0 to $377 with a mean of $73.83. Household wealth did not differ significantly between the two villages. It is worth noting that household wealth was estimated in part from the amount of land reported by participants to be currently under cultivation for either subsistence crops or cash crops. This method gives a very conservative figure for wealth, as virtually all households possess much more land than they have under cultivation at any one time. In addition, since land is never sold, its contribution to wealth is derived from the crops produced on it rather than from the land itself. Although chronic undernutrition is extremely prevalent in the area, it is caused entirely by the high-carbohydrate, low-protein composition of the diet, rather than by food restriction. Indeed, it is exceedingly rare to hear anyone in the area complain of hunger. Food is plentiful (especially the dietary staple, sago starch), and among the majority of people who subsist on a traditional rather than store-derived diet, household wealth per se does not contribute to differences in nutritional status.

FIGURE 7.7 *Comparison of Wealth of Households at Weis and Wulukum*



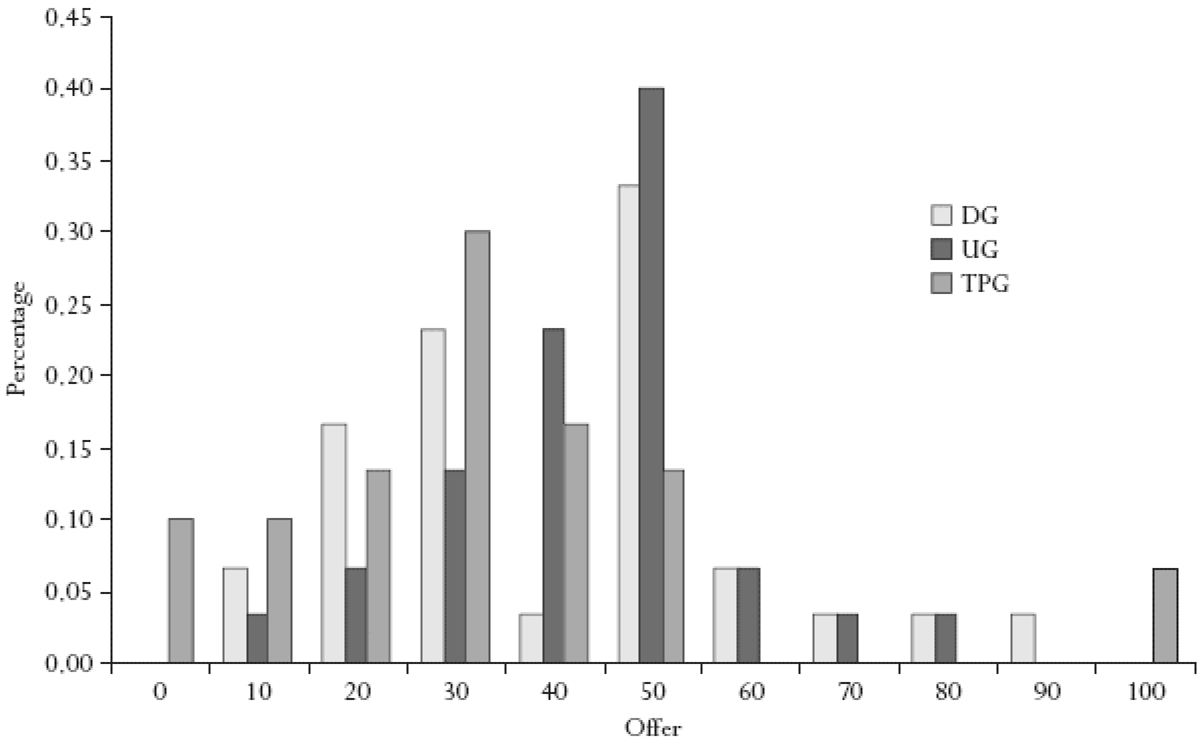
Source: Authors' compilation based on author data.

Game Outcomes

Figure 7.8 shows the amounts offered by player 1s in the dictator and ultimatum games at Weis and in the third-party punishment game at Wulukum. Although it was predicted that the lack of a capacity to reject offers in the DG should lead to lower offers on average than in the UG, in fact the figure shows that the modal offer in both games was exactly 50 percent of the stake. The distribution of offers in the DG, however, is slightly skewed toward lower offers, such that the DG mean offer is 40 percent and the UG mean offer is 44 percent. This difference in mean offers is significant ($p < 0.01$).

The threat of punishment by a third party might be expected to coerce player 1s to be fair, if not overly generous, in their offers, especially if the threat is believed to be credible. As shown in figure 7.8, this was obviously not the case at Wulukum. In contrast to the previous two games, in which the modal offer was 50 percent, the modal offer in the third-party punishment game was 30 percent. Moreover, the distribution of offers in the game was such that the mean offer was 32.7 percent of the stake—lower again than in the previous two games.

FIGURE 7.8 *Offer Amounts in the Dictator, Ultimatum, and Third-Party Punishment Games*



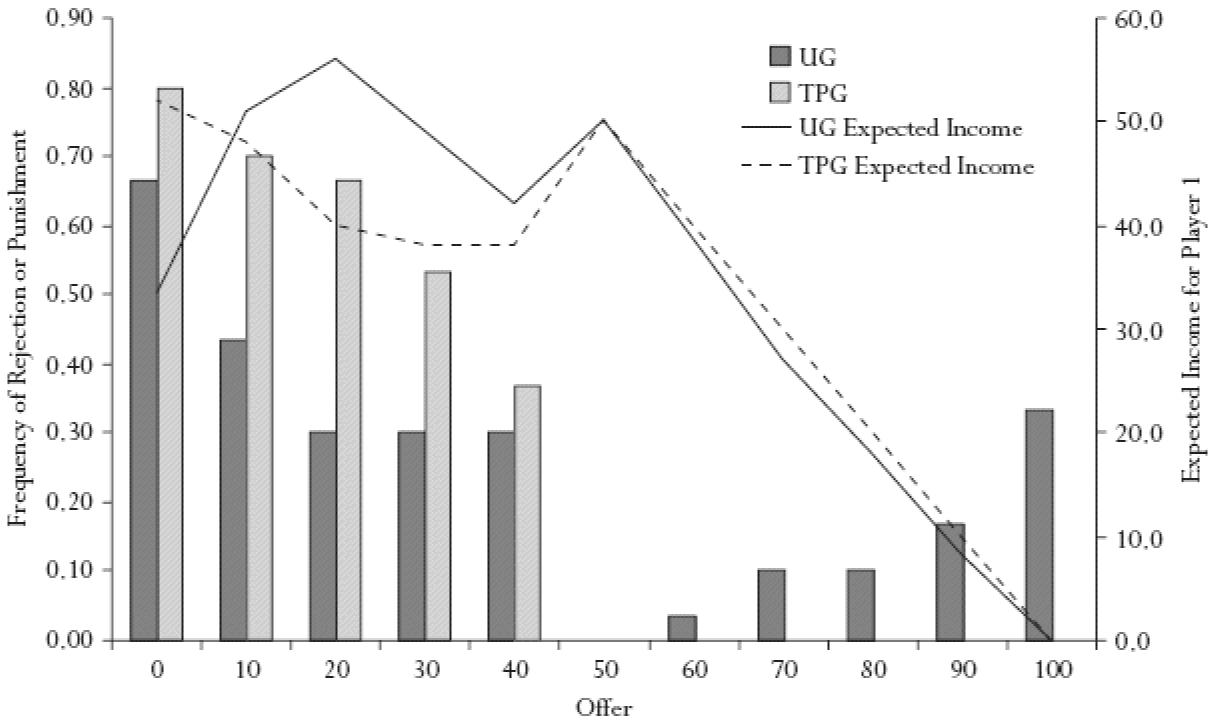
Source: Authors' compilation based on author data.

Figure 7.9 shows the frequency with which player 2s in the ultimatum game and player 3s in the third-party punishment game said that they would reject and punish, respectively, each specific offer. The distribution of rejections in the UG is not monotonic but instead is highest at 67 percent rejection of offers of 0 percent of the stake, and it falls gradually to 0 percent rejection of 50 percent of the stake. The frequency of rejection then begins to rise slowly among the "hyper-fair" offers, with a rejection of 3 percent of offers of 60 percent, rejection of 10 percent of offers of 70 and 80 percent, rejection of 17 percent of offers of 90 percent, and 33 percent rejection of offers of 100 percent of the stake. Using the distribution of rejections, a minimum acceptable offer (MinAO), the lowest amount below 50 percent of the stake acceptable to a player 2, and a maximum acceptable offer (MaxAO), the highest amount above 50 percent of the stake acceptable to a player 2, was computed for each player. The average MinAO for the total sample of recipients was 20 percent of the stake, and the average MaxAO was 93 percent of the stake. The dark line in figure 7.9

shows expected payoffs to player 1s given the amount of their offer and the likelihood that their offer will be accepted or rejected. It shows that the income-maximizing offer (IMO) in this sample is 20 percent of the stake—much less than the overly generous 50 percent that in fact occurs most frequently.

Given that player 2s in the ultimatum game tend to reject both low and hyper-fair offers, it is instructive to examine whether third-party enforcers punish proposers of both low and hyper-fair offers. Figure 7.9 shows that this is in fact not the case. For offers of 0 to 40 percent, player 3s are actually willing to punish at higher frequencies in the TPG than player 2s are to reject in the UG. For example, while offers of 0 percent in the UG are rejected 67 percent of the time, proposers of 0 percent in the TPG are punished 80 percent of the time. Even at offers of 40 percent, player 3s are willing to punish 7 percent more frequently than player 2s in the UG reject such offers. As in the UG, punishment in the TPG falls to 0 percent for offers of 50 percent of the stake. Interestingly, however, and in contrast to the UG results, the frequency of punishment does not rise again thereafter but remains at 0 percent for all hyper-fair offers. The gray line in figure 7.9 shows expected payoffs to player 1s given the amount of their offer and the likelihood that player 3s will punish such offers. It shows that the income-maximizing offer is 0 percent of the stake, with offers of 50 percent yielding just slightly lower payoffs. The actual modal offer of 30 percent yields on average approximately 12 to 14 percent lower payoffs than either of the two IMOs.

FIGURE 7.9 *Frequency of Rejection in the Ultimatum Game and Punishment in the Third-Party Punishment Game and Corresponding Expected Incomes, by Offer Percentage*



Source: Authors' compilation based on author data.

Demographic and Market-Related Correlates of Offers

Tables 7.1 through 7.5 present the results of a series of multiple linear regression models examining predictors of offers in the three games as well as the minimum acceptable offer (that is, the minimum offer not rejected) in the ultimatum game and its analogue in the third-party punishment game, the lowest offer not punished. The predictor variables are gender, educational attainment, individual income, household wealth, household size, frequency of church attendance, and proficiency in the national language. Significant effects of predictor variables are seen primarily for UG offers (table 7.2) and MinAOs in the UG (table 7.3). Frequency of church attendance exerts a significant negative effect on UG offers, and proficiency in English exerts a positive effect. However, the adjusted r-squared for the final model, 16.7 percent, is relatively small. For the minimum acceptable offer in the ultimatum game, both higher educational

attainment and larger household size are significantly associated with lower acceptable offers. Again, however, the adjusted r-squared for the final model, 16.6 percent, is small.

TABLE 7.1 *Linear Regressions of Au Dictator Game Offers*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Gender dummy	−5.248					
	(16.679)					
Education	0.744	0.877				
	(4.780)	(4.647)				
Individual income (U.S. dollars)	−167.810	−164.622	−170.668			
	(198.596)	(193.578)	(186.249)			
Household wealth (U.S. dollars)	0.469	0.306	0.203	0.367		
	(4.525)	(4.387)	(4.246)	(4.226)		
Household size	−5.566	−5.331	−5.316	−5.534	−5.339	
	(5.810)	(5.624)	(5.486)	(5.460)	(4.865)	
Attendance at church services	−0.454	−1.010	−1.174	−0.973	−0.920	−0.959
	(4.979)	(4.543)	(4.351)	(4.329)	(4.187)	(4.425)
Proficiency in national language	4.957	5.504	6.079	6.459	6.507	5.491
	(9.736)	(9.350)	(8.624)	(8.581)	(8.368)	(8.937)
Constant	50.715***	50.022***	50.767***	50.186***	50.266***	40.222***
	(13.732)	(13.229)	(12.319)	(12.255)	(11.943)	(4.000)
Observations	30	30	30	30	30	30
Model significance	0.917	0.859	0.760	0.778	0.614	0.827
Adjusted R-squared	−0.221	−0.163	−0.107	−0.098	−0.049	−0.059

Source: Authors' calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except gender.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

Qualitative Perspectives

Statements made by the game participants in the twelve postgame interviews and in ad libitum remarks and questions during the game provide insights into the reasons why some individuals acted as they did during the game.

The strategic nature of several player 1s' decisionmaking process is illustrated by a question that recurred a number of times during the explanation of the ultimatum and third-party punishment games. These

participants asked if they could make an initial offer and have an opportunity to add to it later should the other party decide to reject or punish. This question suggests that at least some player 1s were in fact making strategic decisions about striking a balance between maximizing their own payoffs and preventing rejection, or possibly simply about not offending the other player with whom they were paired.

Another theme emerged recurrently in the ultimatum game among player 2s who rejected high offers. These individuals consistently expressed an aversion to or fear of accepting high offers, though none could articulate exactly why: "It's not good for me to take too much from someone," some said, and, "Ten kina is too much to accept from someone." These sentiments are very similar to those expressed in a previous UG study in the Au village of Anguganak and one neighboring Gnau village (Tracer 2004).

TABLE 7.2 *Linear Regressions of Au Ultimatum Game Offers*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Gender dummy	8.443					
	(10.369)					
Education	−0.908	−1.121				
	(2.972)	(2.934)				
Individual income (U.S. dollars)	69.079	63.950	71.678			
	(123.461)	(122.202)	(117.916)			
Household wealth (U.S. dollars)	0.575	0.838	0.970	0.901		
	(2.813)	(2.769)	(2.688)	(2.645)		
Household size	5.974	5.596	5.578	5.669	6.146*	
	(3.612)	(3.550)	(3.473)	(3.417)	(3.053)	
Attendance at church services	−5.564*	−4.670	−4.460	−4.545	−4.415	−5.681*
	(3.095)	(2.868)	(2.754)	(2.709)	(2.628)	(3.007)
Proficiency in national language	13.655**	12.775**	12.040**	11.880**	11.997**	10.959*
	(6.053)	(5.902)	(5.460)	(5.371)	(5.251)	(6.072)
Constant	27.457***	28.571***	27.619***	27.863***	28.058***	44.243***
	(8.536)	(8.351)	(7.799)	(7.671)	(7.494)	(2.718)
Observations	30	30	30	30	30	30
Model significance	0.200	0.156	0.094	0.055	0.025	0.084
Adjusted R-squared	0.143	0.158	0.194	0.219	0.250	0.106

Source: Authors' calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except gender.

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

Several participants who said that they would not reject any offer in the ultimatum game or punish any offer in the third-party punishment game were asked why they were willing to accept low offers or even an offer of nothing at all. Several recurrent themes emerged in response. One involved ceding control of the situation for the sake of keeping the peace because the other player was perceived to have been placed in the role of decisionmaker: “He is the decisionmaker, so I'll take what I'm given,” said one player 2. “I don't like disputes, so I'll let him do whatever he wants and I will have no hard feelings,” said another. “That was his choice to make.” And one player 2 admitted, “I am just agreeable, I don't like anger and fights.” Several player 2s expressed concern for the plight of player 1: “It's all right, maybe he really needs it and has some work he has to do with it,” one said, and yet another asserted, “It's not good, it's not a good split, but I don't care, he probably has a reason.”

Perhaps the most interesting, if not amusing, occurrence happened with a UG player 1. After we finished explaining the game, testing him for comprehension, and being satisfied that he understood it, this player 1 proceeded to make the following offer: “I'd like to offer the second person four kina, keep four kina for myself, and give you two kina for setting up the deal between us. It's a little ‘thank you’ to you.” After Tracer thanked him but explained that he could not take any money in the game, this player 1 offered player 2 50 percent of the stake.

TABLE 7.3 *Linear Regressions of Au Ultimatum Game Minimum Acceptable Offers*

Variable	(1)	(2)	(3)	(4)	(5)
Education	−10.092*	−10.353*	−7.901	−7.882*	−7.015
	(5.406)	(4.945)	(4.863)	(4.323)	(4.288)
Individual income (U.S. dollars)	−15.495				
	(109.859)				
Household wealth (U.S. dollars)	−6.208	−6.478			
	(4.640)	(4.117)			
Household size	−9.820**	−9.794	−8.682*	−8.673*	−10.204**
	(4.605)	(4.481)	(4.585)	(4.383)	(4.207)
Attendance at church services	1.009	1.032	−0.040	2.751	
	(4.186)	(4.073)	(4.161)	(3.935)	
Proficiency in national language	16.276	16.875	11.017		
	(12.227)	(11.167)	(10.910)		
Constant	62.637***	62.892***	49.954***	49.903***	56.642***
	(18.795)	(18.219)	(16.847)	(15.590)	(14.552)
Observations	30	30	30	30	30
Model significance	0.174	0.101	0.142	0.070	0.052
Adjusted R-squared	0.152	0.196	0.137	0.178	0.166

Source: Authors' calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except gender.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

DISCUSSION AND CONCLUSIONS

Results from previous cross-cultural research (Henrich et al. 2001; Henrich et al. 2010) have suggested that degree of market integration and, to a lesser extent, wealth and income may exert a direct effect on fairness in several economic games. In the present study, neither household wealth nor personal income was correlated with offer amounts in the dictator, ultimatum, and third-party punishment games. It must be noted, however, that the degree of variability in market integration measures among participants residing in the same village was exceedingly low. By contrast, there was somewhat more variability among individuals in family size, commitment to church attendance, and knowledge of spoken English. Moreover, of these, church attendance and knowledge of at least some English may be better indicators (or at least more common indicators, given

the remoteness of the area) of the diffusion of at least some "Western" norms and values into the area than income or wealth. Indeed, these variables were related to offer amounts in the ultimatum game, albeit in different directions—more frequent church attendance exerted an inverse effect and greater knowledge of English exerted a positive one. Animal wealth and land in cultivation were not related to offer amounts. In one of our previous studies (Tracer 2004), participants from the relatively wealthier and more market-integrated Anguganak Village tended to offer slightly more in the ultimatum game than their poorer, less market-integrated counterparts at Bogasip Village. The difference between mean offers, however, was not significant. Like that study, the present research suggests that some indices of market integration—or perhaps more accurately, of Western influence—are associated with higher offers, but overall the association is fairly weak.

TABLE 7.4 *Linear Regressions of Au Third-Party Punishment Game Offers*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Gender dummy	13.699					
	(16.816)					
Education	3.806	1.431				
	(6.542)	(5.814)				
Individual income (U.S. dollars)	−0.362	−0.320	−0.377			
	(2.594)	(2.574)	(2.513)			
Household wealth (U.S. dollars)	−1.763	−0.605	−1.157	−0.822		
	(8.744)	(8.565)	(8.102)	(7.633)		
Household size	−6.726	−7.350	−7.572	−7.537	−7.637	
	(6.201)	(6.108)	(5.922)	(5.800)	(5.616)	
Attendance at church services	2.008	2.390	2.404*	2.387*	2.361*	1.504
	(1.493)	(1.407)	(1.378)	(1.346)	(1.300)	(1.155)
Proficiency in national language	12.797	12.865	14.418	14.140	14.045	11.455
	(11.856)	(11.769)	(9.740)	(9.374)	(9.153)	(9.092)
Constant	33.333	36.330*	39.037**	38.312**	37.484**	22.129***
	(20.901)	(20.424)	(16.869)	(15.842)	(13.584)	(7.669)
Observations	30	30	30	30	30	30
Model significance	0.670	0.638	0.506	0.358	0.217	0.262
Adjusted R-squared	−0.077	−0.062	−0.020	0.020	0.057	0.027

Source: Authors' calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except gender.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

The modal offer amount was 50 percent of the stake in both the dictator and ultimatum games conducted at Weis Village. When player 2s are unable to sanction by rejecting offers in the DG, the usual result has been lower offers than are seen in the UG (Camerer and Fehr 2004). In this study, although the modes were equal, offers in the DG were more left-skewed (that is, toward lower offers) than in the UG, so that the DG mean offer was approximately 4 percent less than the UG mean offer. This difference was statistically significant.

In the ultimatum game, the income-maximizing offer—the best strategy given prevailing rates of rejection—was computed to be 20 percent, that is, 30 percent lower than the actual modal offer. It is possible that the prevailing generosity norm evident in everyday life among the Au was also at play in Au game behavior. It is also possible that given the strong

generosity norm and extremely close social fabric of Au villages, individuals were more averse to the risk of rejection than concerned about maximizing payoffs.

The threat of punishment by a third-party enforcer in the third-party punishment game might have been expected to result in greater generosity and a higher modal offer than in either of the previous two games. This was not, however, the case. The modal offer in the TPG was 30 percent compared to 50 percent in the other games. One possible explanation for this result might be the recent experimental finding by Ernst Fehr and Bettina Rockenbach (2003) indicating that the threat of punishment (compared to a reliance on trust) actually has the effect of reducing cooperation. An alternative explanation is that the introduction of fining into the dictator game produces a "crowding-out" effect (Bohnet, Frey, and Huck 2001; Frey 1993), essentially reducing the intrinsic motivation of player 1s to be "fair" and shifting their attention to the concerns of an extrinsic fining authority. Expecting a fine to reduce their payoff by three-fifths, player 1s are induced to keep a larger amount of the stake for themselves. Finally, however, because the third-party punishment game was carried out at Wulukum and the other games at Weis, village effects on game play cannot be ruled out as the cause of lower offers in the TPG.

TABLE 7.5 *Linear Regressions of Au Lowest Game Offers Not Punished in Third-Party Punishment Game*

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Gender dummy	1.654					
	(12.078)					
Education	3.282	2.602				
	(9.096)	(7.450)				
Individual income (U.S. dollars)	10.933	11.188	13.058			
	(10.578)	(10.178)	(8.490)			
Household wealth (U.S. dollars)	3.667	3.616	3.799	4.866		
	(4.801)	(4.679)	(4.560)	(4.633)		
Household size	−0.517	−0.711	−0.888	−0.750	−0.451	
	(4.107)	(3.768)	(3.662)	(3.763)	(3.760)	
Attendance at church services	−1.329	−1.207	−1.156	−1.375	−1.338	−0.971
	(1.374)	(1.024)	(0.994)	(1.011)	(1.013)	(0.964)
Proficiency in national language	−17.297	−16.295	−12.278	−5.623	−5.096	−3.360
	(17.239)	(15.258)	(9.830)	(9.074)	(9.079)	(8.786)
Constant	30.938*	31.776*	32.079*	33.806**	40.996**	36.371***
	(17.296)	(15.812)	(15.484)	(15.876)	(14.368)	(6.573)
Observations	30	30	30	30	30	30
Model significance	0.632	0.503	0.379	0.561	0.594	0.580
Adjusted R-squared	−0.066	−0.019	0.020	−0.035	−0.040	−0.032

Source: Authors' calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except gender.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

In our previous experimental work in Papua New Guinea (Tracer 2003, 2004), we reported a remarkable pattern of rejections in the ultimatum game that at the time had been seen nowhere else in the world. In that research, UG participants in two villages (N = 55 pairs) were seen to reject both low offers and, incredibly, hyper-fair offers just over one-third of the time. Low offers were seen as unfair, and hyper-fair offers seemed to provoke a fear response. Large unsolicited gifts, which individuals sometimes refuse to accept, provoke a similar response among individuals in everyday Au life, and we interpreted the game response as a translation of the familiar "everyday life" reaction to the new and unfamiliar circumstance of the economic game. The pattern of rejections seen in the previous UG study was replicated in the present one. Rejection is highest, at

67 percent, for offers of 0 percent of the stake, and it falls to 0 percent for offers of 50 percent. It then rises again, albeit slowly, among hyper-fair offers, to a rejection rate of 3 percent of offers of 60 percent, 10 percent of offers of 70 percent and 80 percent, 17 percent of offers of 90 percent, and a remarkable 33 percent of offers of 100 percent of the stake. Moreover, our qualitative results confirm that the primary emotion involved in the rejection of high offers was fear—probably fear of indebtedness.

We tested to see whether the pattern of punishment in the third-party punishment game would follow the pattern of rejection in the ultimatum game. In particular, we were interested, first, in whether player 3s would punish player 1s who made low offers at frequencies similar to those of rejecters in the UG, and second, whether player 3s would punish those making hyper-fair offers. Our results indicate that player 3s were willing to punish low offers at frequencies that were higher on average than the rate of rejection among UG player 2s. Similar to the pattern observed in the UG, the rate of punishment fell to 0 percent for offers of 50 percent, but in contrast, it remained at that level thereafter—that is, player 3s punished violators of the generosity norm but did not punish individuals who were overly generous. Instead, it appears that generosity was always favored and that people left it to the discretion of those directly involved in the exchange whether they chose to accept or reject the offer and the level of indebtedness it might imply.

Overall, our results suggest that a strong generosity norm prevails among the Au, as in other Melanesian societies. The norm seems to persist even in the absence of sanctions for its violation (as in the dictator game), though the threat of sanctions (in the ultimatum game) does seem to raise the mean level of generosity modestly. Our work suggests, however, that rather than bolstering prosocial behavior, the introduction of third-party enforcers may actually sabotage it. Finally, like our previous work (Tracer 2003), this study again suggests the utility of experimental economic methods, especially when used in tandem with ethnography, for understanding the basis and persistence of human social norms.

NOTES

1. The term "exchange" is used here to apply both to bidirectional exchanges and to gift-giving, which may be unidirectional, at least in the short term.

2. Conversely, a generosity norm could also be sustained by providing sufficient rewards to its adherents so that the benefits of compliance outweigh its costs. This study examines and discusses only the effects of sanctions and punishments in the case of noncompliance. It would be relatively easy, however, to design a test of the complementary "rewards" hypothesis.

3. It does not matter for the purposes of this hypothesis whether individuals seek to maximize utility in an absolute fashion or relative to others in their social group, only that they are self-interested. In either case, the expectations hold that individuals will seek to defect from cooperation in the absence of norm enforcement and will adhere to the norm in the presence of sanctions and enforcers. However, see Tracer (2004) for a discussion of "absolute" or "self-regarding" maximization versus "relative" or "other-regarding" maximization.

4. It was contended that the new wife of the hunter had convinced him to give her family a larger stake of the kill at the expense of his own extended family.

5. However, given that very few of the participants engaged in wage labor of any kind, the 10-kina stake was highly valued.

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Chapter 8

The Tsimane' Rarely Punish: An Experimental Investigation of Dictators, Ultimatums, and Punishment

Michael D. Gurven

With a revised, standardized set of protocols, the Roots of Human Sociality Project examined whether prior "anomalies" not predicted by any of the available social preference models would reappear in the second round of games played in fifteen small-scale cultures. If they did, we could be more confident that the initial results were robust and not artifacts of an inconsistent methodology. Furthermore, the non-industrialized environmental settings characteristic of the fifteen cultures, with varying degrees of market integration, would allow for a serious treatment of the role of culture, the development, maintenance, and evolution of social norms, and the effects of market access and integration on prosocial behavior (see chapter 2). In this second round of games, with a systematic set of variables measuring different aspects of market access and integration, we were able to examine whether integration, acculturation, and experience with anonymous others in market settings leads to the more uniform and modal patterns of game behavior seen in industrialized societies.

Adding the third-party punishment game to the repertoire and applying the strategy method to the ultimatum game gave us greater insight into responder behavior and therefore into second-party and third-party punishment of perceived cooperative norm violations as well. The results of these new games have important implications for our understanding of how reciprocal altruism and other models of cooperation operate in natural populations and how different social preferences lead to variable game behavior in different contexts (see, for example, Bolton and Ockenfels 2000; Charness and Rabin 2002; Falk and Fischbacher 2000; Fehr and Schmidt 1999; Rabin 1993). Finally, the inclusion of follow-up interviews of selected game players provides additional ethnographic insight into how players

viewed the games and their expectations of others' game behavior. Only through ethnographic interviews can we understand the links between emotional responses to specific situations, the internalized norms brought to bear on emotions and behavior, and individuals' actual behavioral choices.

This chapter examines the strategy method ultimatum game (UG), the dictator game (DG), and the third-party punishment game (TPG) as played among the Tsimane' of Bolivia. By allowing comparison with the results reported in the other chapters of this volume, it addresses several questions aimed at assessing cross-cultural validity:

1. To what extent is within-culture variation in game behavior explained by demographic and market-oriented variables? Are more educated, fluent, and market-oriented individuals more likely to uphold equality-based norms or norms that favor short-term gains?
2. How prevalent is second- and third-party punishment?
3. To what extent is proposer (player 1) behavior in the strategy method UG and the TPG linked to the taste of responders (player 2s) for punishment?
4. How good are people at guessing how others will behave?
5. Is there consistency in the offers made by the same individuals across the strategy method UG and the DG?

Two more questions are uniquely addressed in this chapter:

6. Do the same people show similar game behavior in the DG after a two-year gap?
7. Are those individuals who are good at guessing others' decisions (as measured by a matching game) more likely to choose modal offers in the DG and income-maximizing offers in the strategy method UG?

THE STUDY POPULATION: TSIMANE'

The Tsimane' are Amazonian forager-horticulturalists living in the Beni Department of Bolivia in the eastern foothills of the Andes Mountains. Tsimane' live in small villages consisting of fifty to two hundred individuals,

and these are usually composed of a number of extended family clusters. Villages are located along major rivers, although villages can also be found in terra firma areas in the Isiboro-Sécure region. The majority of Tsimane'—over four thousand—occupy over sixty villages along the banks of the Maniqui River. Almost all of the food the Tsimane' consume comes from horticulture, fishing, hunting, and gathering. They cultivate plantains, rice, corn, and sweet manioc in small swiddens and regularly fish and hunt for meat. Fish, game, and gathered foods make up about one-quarter of their diet, although this varies depending on the season and local abundance. More detailed background information on the Tsimane' is provided by Avecita Chicchón (1992), Viki Reyes-García (2001), and my colleagues and myself in Gurven, Kaplan, and Supa (2007). I focus here on the relevance of cooperation in daily economic and social life and the relevance of markets and acculturation.

Cooperation

There is a strong sense of economic independence at the level of the nuclear family and extended Tsimane' household. Each family has its own set of fields, and sometimes individuals within families own specific fields. Over 70 percent of the diet comes from the fields and house gardens. Men within a household clear and burn unused primary or secondary forest to create new fields during the dry season, while both men and women harvest and weed fields throughout the year. Occasionally male relatives or affines collaborate in some of these activities. Single-day hunting and fishing activities are usually done alone or with up to two male partners, usually a sibling, son, in-law, or age-mate. Group fishing events are the exception to this pattern: several families, or sometimes entire villages, use plant poisons to fish in closed-off sections of rivers, streams, and lagoons. Several men perform all of the work (acquiring the plant poisons, closing off the body of water, pounding the poison), and many more individuals, including women and children, harvest the fish with bow and arrow, machete, or knife. In a cross-village sample, Ricardo Godoy and his colleagues (2004) estimated that one-fourth of all fishing events are communal. Finally, entire families often go on extended fishing trips in riverine villages or on extended hunting trips in the interior forest villages; these trips can last anywhere from two days to several months.

An estimated 10 percent of household consumption derives from gifts or transfers from relatives and friends, while 88 percent comes from the labor efforts of household members (Godoy et al. 2004). Some foods are shared more than others. The most widely shared food is manioc in the form of home-brewed beer (shocdye). Strong beer always draws many visitors, and beer-drinking often continues until none remains. Any Tsimane' can visit another Tsimane' household and expect to be served. As in other small-scale populations, large game may be shared with great depth but restricted breadth: that is, most of it is shared, but with only several households (Gurven, Hill, and Kaplan 2002). Small game, such as birds and squirrel monkeys, tends to be shared only within the household. Food preparation and cooking is usually done in the open (kitchens usually do not have walls), but food is consumed inside houses. Cooked meals are usually consumed by household members. Though people eat communally in smaller villages, they usually do not go out of their way to invite others to partake in their meals. Tsimane' often turn their backs to others when they eat, and people in more modern villages often complain that neighbors do not share meat. Some evidence suggests that food is not shared extensively during difficult times. In a study of risk management in two Tsimane' villages, Ricardo Godoy, Elizabeth Byron, and their colleagues (2005) report that only 5 percent of those interviewed said that kin or neighbors help them cope with misfortunes such as illness or crop loss.

In villages with schools and chiefs, men usually engage in communal village labor, such as clearing soccer fields and building schools. Both men and women also help organize festivities. In a panel study done during 2001–2002 in thirty-seven villages, Godoy, Byron, and their colleagues (2005) found that 92 percent of households had made some gift of food and that 61 percent of households had engaged in some communal labor in the week prior to the interview. Nonetheless, gifts are usually small and given to close kin, while communal labor is of brief duration.

Market Affiliation and Acculturation

Although the Tsimane' were exposed to Jesuit missionaries in the late seventeenth century, they were never successfully settled in missions, and they remain relatively unacculturated. The extent of their isolation is suggested by the fact that their language is an isolate, even within Bolivia; it

shares a similar vocabulary and grammar only with the Mosetene, who inhabit the southern and northern stretches of Tsimane' territory. New mission posts were not established in several of the villages until the 1950s (Chicchón 1992). The greatest influence of one of those posts, the New Tribes Mission, was to create a system of bilingual schools with trained Tsimane' teachers and an elected village chief in each village downstream from the Catholic mission, Fátima. Chiefs act as representatives primarily in interacting with outsiders and helping to organize group labor. They receive neither salary nor tribute and are generally not awarded much prestige.

Tsimane' villages vary in their degree of market access and interaction with outsiders. Acculturation occurs in several domains, beginning with the schools that have been established in over three-quarters of all Tsimane' villages over the last two to twenty years. Tsimane' also occasionally visit the main market town, San Borja (with a population of about 24,000), to attend town festivals, sell agricultural produce and handicrafts, and acquire highly valued market items such as clothing, aluminum pots, salt, sugar, kerosene, utensils, and school supplies. On average, however, only 2 to 6 percent of their diet derives from market purchases. In addition, since the 1970s Tsimane' have come into greater contact with outsiders as new roads have been built; a burst of logging, trading, and encroachment by lowland and highland colonists has ensued, and some Tsimane' engage in wage labor for logging companies. Near San Borja, some Tsimane' also work as farmhands for local ranchers. Along the upper Maniqui River, Tsimane' often collect jatata palm leaves and weave them into roofing panels. These panels are then traded with itinerant merchants who provide market goods and alcohol. The exchange rates vary among merchants, but most are unfavorably low. Goods are usually given in advance of payment, and Tsimane' rarely refuse these “gift” advances, which puts many households under debt peonage to these river merchants.

A study by Godoy and his colleagues (2004) has shown that neither market access nor economic development is consistently associated with economic inequality across a sample of fifty-nine Tsimane' villages, where inequality was measured in terms of either monetary income, household wealth, or rice production. Gini coefficients estimating these inequalities vary from 0.3 to 0.8 (mean = 0.539) for monetary income, 0.1 to 0.5 (mean = 0.281) for household wealth, and 0.2 to 0.8 (mean = 0.471) for rice production. Thus, there is little direct evidence that increased market

exposure has led to substantial increases in inequality beyond what already existed in the traditional domains of economic production.

Prior Results

An ultimatum game without the strategy method was played in five villages along the Maniqui River in 1999 (Gurven 2004a, 2004b). Mean and median for the combined sample was 37 percent with modal offers at 50 and 30 percent. In multivariate analyses, fluent Spanish speakers gave about 13 percent more than monolingual Tsimane' speakers, men gave about 10 percent more than women, and the least-educated gave about 14 percent more than the most-educated. However, the strongest predictor of offer level was the identity of one's resident village.

A dictator game was played in Cosincho in 2000 (Gurven 2004b). Mean, median, and modal offers were 32, 30, and 25 percent, respectively. As in the ultimatum game, men gave about 6 percent more than women, and the most frequent visitors to San Borja offered about 10 percent more than those who rarely left the village to go to market. Both games used increments of 5 percent rather than the 10 percent increments used in the current games.

A series of dictator games played in eight villages in 2005 confirmed that there was substantial variation in prosocial game behavior among villages, and that village patterns were recognized by residents (Gurven, Zanolini, and Schniter 2008). Differences in socioeconomic condition, acculturation, immediate demand for money, and perceived fair offers did not explain away the village differences in game behavior, suggesting that village effects may reflect fluctuating social expectations rather than stable differences in fairness norms.

THE DICTATOR GAME AND THE ULTIMATUM GAME

The Study Village: Cosincho

The DG and strategy method UG were played in the village of Cosincho (Gurven 2004a), which is located about sixty kilometers, or up to several days' journey upstream, on the Maniqui River. Much of the village is located about a fifteen-minute walk from the Maniqui River to the interior and is close to the smaller Cosincho River. Cosincho had 215 residents during the

time of the games, although 12 of these individuals had not lived there for at least several months.

In the center of the village was a soccer field, a new school, and a scattered cluster of eleven families. There were two nearby clusters about a five-minute walk away, one with six families and the other with two. A cluster of four families lived another ten- to fifteen-minute walk away on the other side of the Cosincho River. The other two clusters were more distantly located. One of these clusters, with four families, lived near the Maniqui River about thirty minutes away, and the other lived across the Maniqui River, about forty-five minutes away. The latter cluster moved across the river after political conflicts within the village several years earlier.

Methods

The DG and strategy method UG protocols followed the standard versions translated into Spanish by Clark Barrett (chapter 10, this volume, available at http://www.russellsage.org/Ensminger_Chapter10.pdf). These were translated into Tsimane' with the help of a bilingual Tsimane' assistant, Alfredo Zelada Supa. Zelada, a resident of a community outside this sample, also acted as a personal assistant during all the games. The Tsimane' protocols were then orally back-translated into Spanish to assess the accuracy and clarity of the Tsimane' translation. Revisions were then made in the Tsimane'-language version. Games were played on November 30 and December 1, 2002. All Tsimane' who were eighteen years of age or older were invited to appear at the school in the early morning, upon the ringing of a bell. Roughly 90 percent of eligible residents were present for the group meeting. People were told that they would be playing two games, that they would receive 5 Bolivianos (Bs) as a show-up payment for each game, and that they should play the first game only if they could play the second game. The DG was played first, and the UG second. The sample for the DG was seventy-one individuals (thirty-eight player 1s), and sixty-seven individuals (thirty-six player 1s) for the UG. Four individuals did not return to play the UG after the DG. The stake for each of the games was 20 Bs (or U.S.$2.75; 7.3 Bs = U.S.$1.00), which represented (in 2002) about one day's wage labor with food, or about 0.8 day's wage labor without food. This was the same stake used in Gurven (2004b).

The DG was explained in both Spanish and Tsimane' by Zelada and myself. We gave several examples, according to the script, putting special emphasis on capturing the attention of younger and older individuals, who, experience has shown, have a more difficult time listening to spoken rules in group settings. All questions concerning procedure were answered (“How long will this take?” “When do I play?” “Can we watch the movie about the man and the coconuts [*Castaway*]?”), but these were minimal. We emphasized the confidentiality of responses, and by repeating the appropriate portions of the protocol, we stressed that player 1 (the proposer) could choose to give whatever he or she wished to give, and that the money derived from a U.S.-based foundation solely for this purpose. Both Zelada and I felt that repetition was important, given the relative lack of experience among the Tsimane' with games, or with formal instructions read aloud to an audience.

The initial group explanation took about one and a half hours. Players then entered the school one by one in a random order chosen by an American assistant, Jeffrey Winking. Inside the school, windows were barred and children were dissuaded from peering or listening in. The only people present inside the school were the player, myself, and Zelada. However, Zelada's presence was minimized, as his back was turned during actual play. Zelada is from a different community with no relationship with any of the study communities, and community members said that they did not mind his presence in the room. Nonetheless, I requested his assistance only when test questions were answered incorrectly and therefore the game rules needed to be explained again.

Upon entry into the room, players received additional instruction, a series of test questions, and additional help from myself and Zelada (if necessary) until the test questions were answered correctly. Outside the school, individuals were seated on a concrete patio watching DVD movies. It was forbidden for anyone to discuss the games, and Winking confirmed that no one did. After playing the game, individuals were urged to stay and watch the films. A vat of refreshment was also prepared for players to encourage them to stay. However, several players who lived nearby needed to return to their homes to attend to their children or to eat a midday meal after playing the DG. The majority watched the films eagerly (because these are unavailable in jungle villages). Those who had already played sat on the opposite side of the patio, separated from those waiting to play, to avoid any

potential for interaction. It took five hours for sixty-two people to play the DG on day 1. On day 2, it took one and a half hours for eleven more people who were not present on the previous day to play the DG.

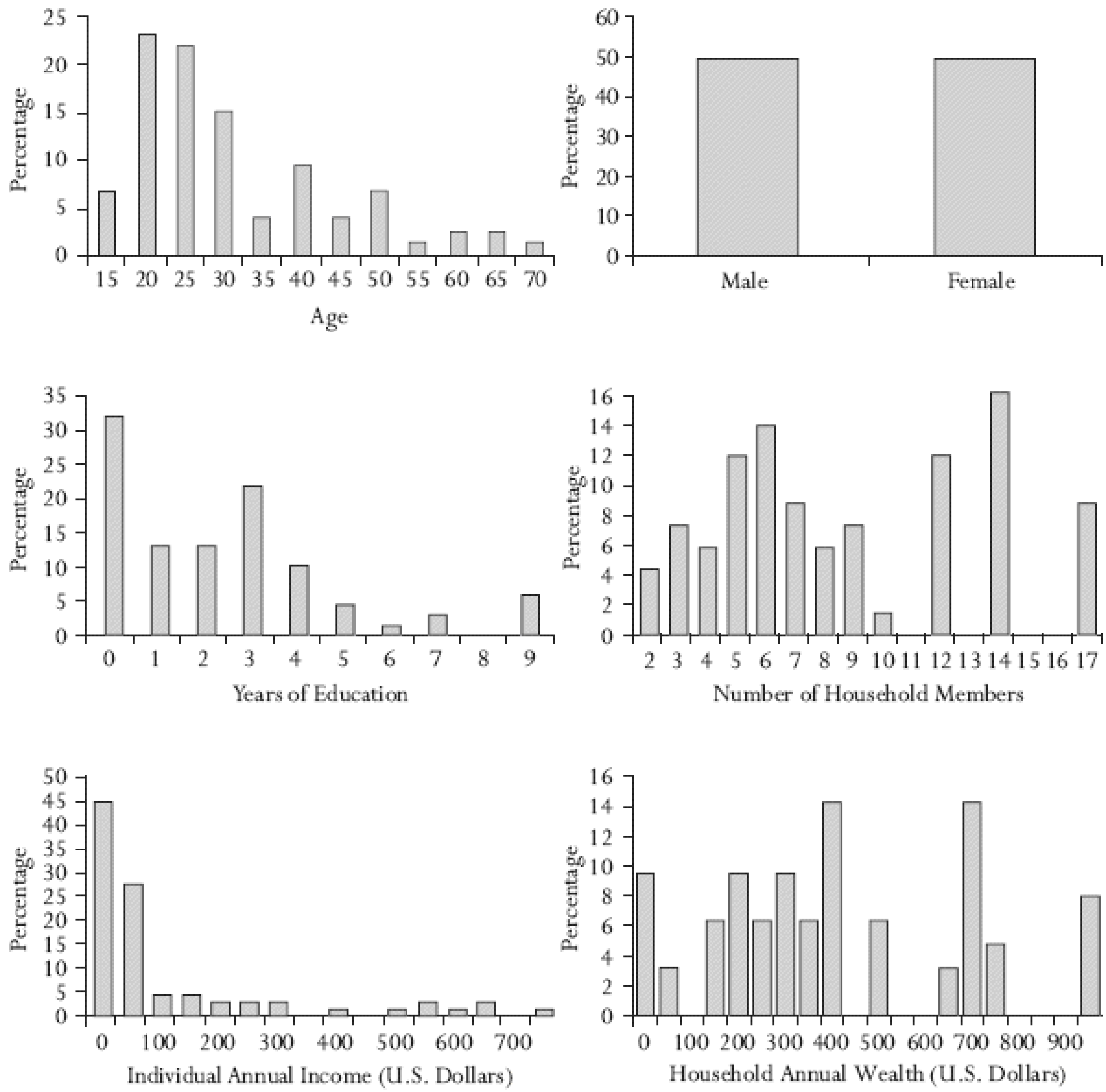
The strategy method UG was explained in a procedure similar to that used for the DG. Explaining the game in the group took about one hour. It then took two hours for thirteen people to play the UG, after which the sun had already set, players were bored and hungry, and the truck battery powering the movie-displaying laptop computer had died. The UG was then continued the next morning for seven and an half additional hours until fifty-four others had played the game (but see chapter 3 for discussion of the effects of this methodological "anomaly"). About half of the players were paid for both of the games in the late evening on day 2, and the remainder of the players were paid the following morning. People were paid individually in a private house location. At this time, selected individuals were asked several questions about their opinions of the game and of others' behavior in the games.

A matching game (MG) was also played in Cosincho—in May 2003 with fifty-nine individuals during household visits—to see whether the ability to converge on focal concepts with other community members would be associated with game play. Individuals were asked to leave their house by themselves to talk privately for several minutes, whereupon they were asked to play a very short game in which they could win 5 Bs. Upon agreement, they were asked to "name a plant [or animal] that others in Cosincho might also name if they were asked the same question. If you name the same plant [or animal] that most others in this village name, then you will win 5 Bs." They were asked this for two categories of objects: forest game animals (jebacdye') and plants (cätidye). It took only a few minutes to play this game with each person. Players were told not to discuss the game with anyone until after payment. Indeed, there was no effect of order of play on the popularity of the responses given for animals ($r = 0.11$, $p = 0.43$) or plants ($r = 0.07$, $p = 0.63$), with popularity measured as the percentage of others who gave the same answer. Individuals were paid after everyone had played. Total play covered two days.

Predictor Variables

Market-oriented experiences tend to fluctuate by week or month. Thus, rather than use the standard interviews based on the previous day's or week's experiences, I estimated the market-oriented variables in Cosincho using a combination of interviews and direct observations of household clusters from a concurrent study (the Tsimane' Health and Life History Project). Interviews during hunting and fishing returns, town visits, and market purchases were done two to three times per week for all households in Cosincho over a ten-month span. From these data, I estimated the number of town visits, wage labor activities, and incomes. I examined food production and consumption during three-hour blocks of time spent observing household clusters. From these data, I estimated market contributions to the diet. To estimate household wealth and domestic animal-based wealth, I conducted wealth surveys in each household, defining wealth as income-generating capital. I estimated land-based wealth from a combination of interviews about household agricultural production and GPS mapping of sample agricultural fields for different cultigens.

FIGURE 8.1 *Predictor Variables for Dictator Game and Ultimatum Game Offers by the Tsimane'*

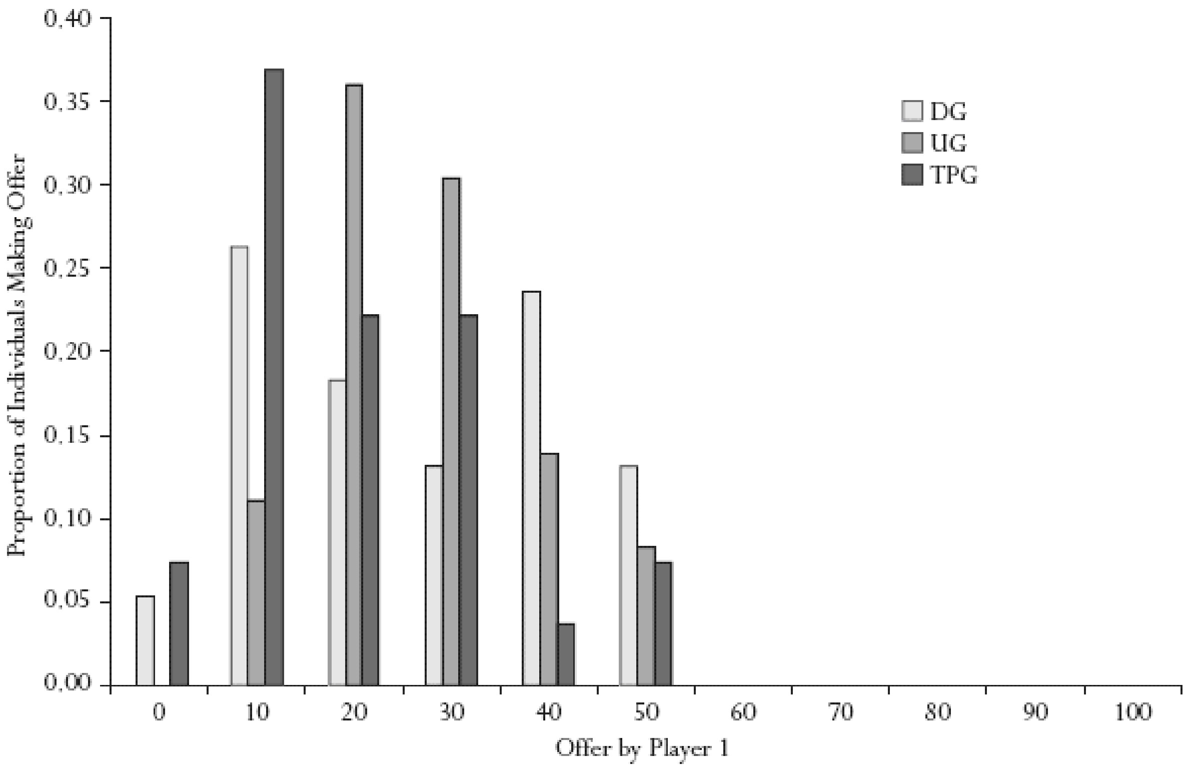


Source: Author's figure based on author data.

I estimated ages of participants from demographic interviews, which incorporated known ages and estimates based on interviews regarding reproductive histories and comparisons with individuals of known ages. Years of education, linguistic competence in Spanish (categorized as 0 = cannot speak, 1 = speak some, 2 = fluent), marital status, number of offspring, household size, and length of residence in Cosincho (total number of years the player had lived in the study village over his or her entire life)

were also garnered from demographic interviews. An examination of cross-correlations reveals that many of these variables are correlated with each other. For example, Spanish ability correlates positively with frequency of and income from wage labor ($r = 0.31$, $p < 0.01$; $r = 0.34$, $p = 0.004$), annual income ($r = 0.35$, $p = 0.003$), trips to market ($r = 0.26$, $p = 0.028$), and education ($r = 0.71$, $p < 0.0001$). Figure 8.1 displays histograms for each of the independent variables for the DG and UG samples.

FIGURE 8.2 *Offer Distributions for the Dictator Game, Ultimatum Game, and Third-Party Punishment Game*



Source: Author's compilation based on author data.

Results: The Dictator Game

Figure 8.2 shows the distribution of offers made by player 1s in the DG. The mean, median, and modal offers were 26, 30, and 10 percent, respectively. A secondary mode at 40 percent is also prominent. Only 13 percent offered half of the 20 Bs stake. To examine significant differences across populations (and also across games), I employed three nonparametric

statistical tests. A Mann-Whitney (M-W) test examines differences in means across samples, a median test examines differences in medians across samples, and an Epps-Singleton (E-S) test examines distributional differences across samples. Table 8.1 compares the DG sample in Cosincho in 2002 with DG results obtained in two other samples, including the Hadza (Marlowe 2004) and the Tsimane' from Cosincho in 2000. The M-W and median tests reveal no significant differences between the Cosincho DG and the other two DG samples, at the 5 percent significance level, as shown in table 8.1. Focusing exclusively on means or medians can be deceiving, however, as revealed by the E-S test, which shows highly significant differences in DG results between the Tsimane' 2002 and 2000 samples, but no difference between the former and the Hadza.

There was no statistically significant difference between mean offers for the first and second days of play (27.5 percent (N= 32) versus 20.0 percent (N = 6), respectively; $p = 0.33$, M-W). The order of play also had no significant effect on offers ($r = -0.14$, $p = 0.39$). However, play day becomes significant after controlling for other predictors in a stepwise regression, using the predictors described in the next section. After controlling for household wealth and income, offers on day 2 were 12 percent lower than those on day 1. This effect is mainly driven by the lack of fifty-fifty splits on day 2. The sample from day 2 was of individuals who were away fishing or visiting another village or who were too tired to appear on the first day of the games. It is possible that this represents a slightly biased sample rather than a decrease in offers due to contamination. Nonetheless, the effect is small and does not change the qualitative results described here (see also Chapter 3).

TABLE 8.1 *Statistical Comparison of Game Samples Drawn from the Tsimane', Hadza, and Germans*

			Epps-Singleton		Mann-Whitney		Median Two-Sample Test		Wilcoxon Signed Rank	
Population 1	Population 2	N	CF	*p*-value	Z	*p*-value	Z	*p*-value	Z	*p*-value
DG 2002	DG 2000	24	26.519	0.000	1.474	0.140	0.835	0.404	−0.140	0.236
	DG Hadza	43	6.520	0.164	1.822	0.069	1.716	0.086		
UG 2002	UG 1999	70	14.675	0.005	−3.679	0.000	−3.037	0.002		
	UG 1999 PM	17	10.212	0.037	2.840	0.005	2.091	0.037		
	UG 1999 LP	16	4.066	0.397	0.757	0.449	1.081	0.280		
	UG 1999 OC	16	11.455	0.022	3.218	0.001	2.421	0.016		
	UG 1999 CAT	10	7.621	0.107	2.141	0.032	0.637	0.524		
	UG 1999 CACH	11	18.377	0.001	3.129	0.002	2.699	0.007		
	UG MACH	21	5.248	0.263	−1.039	0.299	−0.764	0.445		
DG 2002	UG 2002	36	9.964	0.041	0.337	0.736	0.148	0.882	27.000	0.517
TPG 2003	DG 2002	38	4.569	0.335	−1.623	0.105	−1.342	0.180		
	DG 2000	24	24.718	0.000	3.616	0.000	2.440	0.015		
	TPG Berlin	22	2.863	0.581	0.752	0.452	0.617	0.539		

Source: Author's compilation. For DG 2002, author data; for UG 2002 Gurven (2004a); for DG 2000, Gurven (2004b); for DG Hadza, Marlowe (2004); for UG 1999, UG 1999 PM, UG 1999 LP, UG 1999 OC, UG 1999 CAT, and UG 1999 CACH, Gurven (2004a); for UG MACH, Henrich (2000); for TPG Berlin, Fehr and Fischbacher (2004).

Notes: DG 2000 = Dictator Game 2000

UG 2002 = Ultimatum Game 2002

TPG 2003 = Third-Party Punishment Game 2003

DG 2002 = Dictator Game 2002

DG Hadza = Dictator Game 2004 Hadza

UG 1999 = Ultimatum Game 1999 (five villages combined)

UG 1999 PM = Ultimatum Game 1999 Puerto Mendez

UG 1999 LP = Ultimatum Game 1999 La Pampita

UG 1999 OC = Ultimatum Game 1999 Ocuna

UG 1999 CAT = Ultimatum Game 1999 Catumare

UG 1999 CACH = Ultimatum Game 1999 Cachuela

UG MACH = Ultimatum Game 2000 Machiguenga

TPG Berlin = Third-Party Punishment Game 2004 Berlin

TABLE 8.2 *Linear Regressions of Tsimane' Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	1.05				
	(2.61)				
Female	3.86	3.74			
	(3.21)	(3.15)			
Education	0.02	−0.29	−1.36		
	(2.98)	(2.84)	(2.71)		
Individual income	17.51*	17.44*	12.48	11.67	14.35*
	(9.91)	(9.76)	(8.88)	(8.62)	(8.36)
Household wealth	−5.75**	−5.52**	−6.39**	−6.40**	−5.97**
	(2.76)	(2.66)	(2.58)	(2.55)	(2.54)
Household size	2.30	2.16	2.93	3.00	
	(2.72)	(2.65)	(2.59)	(2.56)	
Individual income-squared	−5.77**	−3.80**	−4.85*	−4.72*	−5.34**
	(2.64)	(2.60)	(2.50)	(2.45)	(2.41)
Constant	20.48*	23.37**	29.42***	28.42***	33.07***
Observations	34	34	34	34	34
Model significance	0.137	0.086	0.082	0.046	0.038
Adjusted R-squared	0.14	0.16	0.15	0.17	0.16

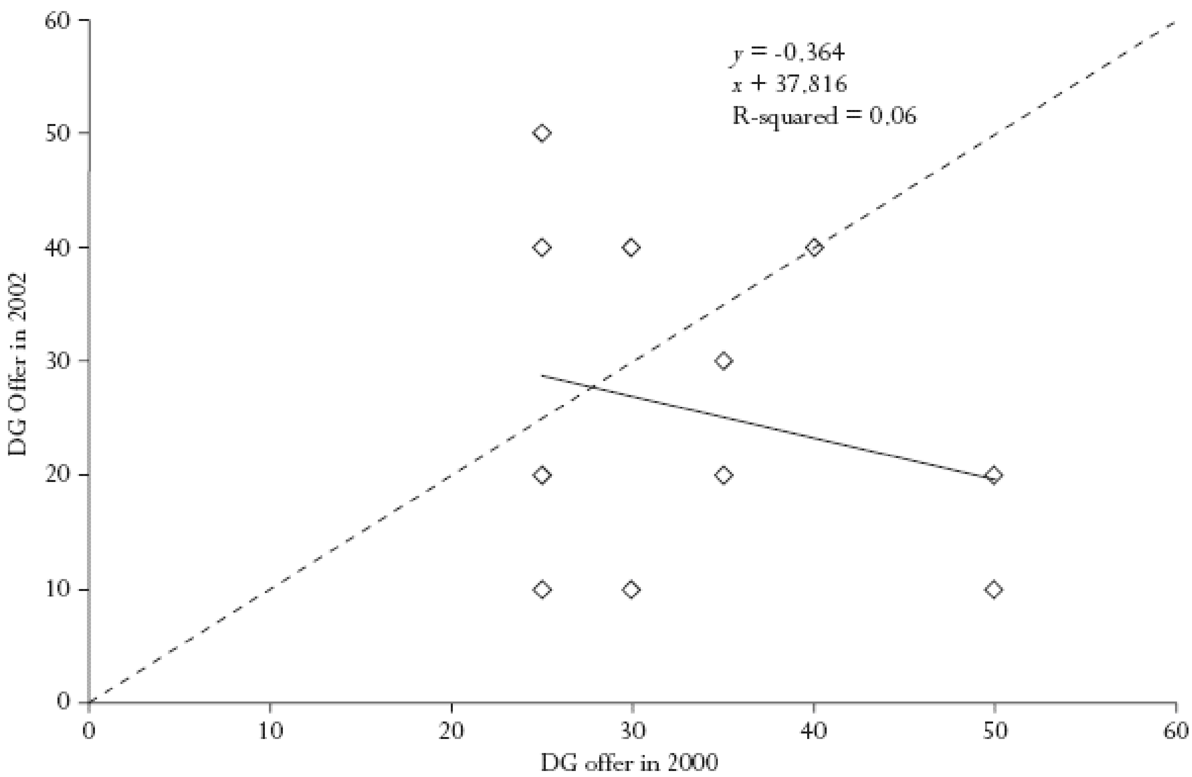
Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

Predictors of Dictator Game Offers

I performed regression analyses to examine whether demographic and market variables predict DG offers. Demographic variables include age, sex, number of years of formal education, and household size. Market-oriented variables, such as percentage of diet derived from the market (whether purchased or traded), frequency of wage labor in the past month, the number of trips to the market town in a typical week, and the amount of land devoted to cash crops, are insignificant and therefore not included in the analysis of DG and UG offers.[1] Additional variables included are household wealth (in U.S. dollars) and individual income (also in U.S. dollars). Figure 8.1 shows histograms of the predictor variables. The results of multivariate analyses are shown in table 8.2. As for all regressions, all independent variables are normalized by dividing by the standard deviations of each variable. Model 1 includes all independent variables, and each reduced model subtracts each of the insignificant variables from model 1.

The only variables found to be statistically significant are household wealth and individual income. Every 100 Bs of additional wealth is associated with a 2 percent decrease in offers. The wealthiest therefore gave 19 percent *less* than the poorest in the sample, controlling for other factors. A linear effect of income is not statistically significant. Instead, income has a quadratic effect such that those with the lowest and highest incomes gave less than those with intermediate incomes.[2] In particular, those who earned more than 4,000 Bs (about U.S.$533) a year gave 1.2 percent less for each additional 100 Bs they earned, while each additional 100 Bs earned up to 2,000 Bs was associated with a 0.3 percent increase in offers. Reduced models reveal robust patterns for household wealth and reasonably robust patterns for individual income. Wealth and income account for 16 percent of the adjusted variation in DG offers.

FIGURE 8.3 *Dictator Game Behavior for Repeat Players in 2000 and 2002*



Source: Author's compilation based on author data.
Notes: N = 12. The dashed line of equality shows where the same players made the same DG offer in both years.

Repeating the Dictator Game

Of the thirty-eight player 1s, twelve were also player 1s in the DG played in 2000. Does repeated play lead to a decrease, increase, or no change in offers? The same people offered an average of 7 percent less in 2002 than in 2000. A Wilcoxon signed rank test for matched pairs shows no significant difference in offers given across study years ($F = -14$, $p = 0.236$). However, the emphasis on mean differences may be misleading. There is no correlation between offers made two years apart by the same twelve participants ($r = 0$ to 0.25, $p = 0.44$). Of the twelve players who participated in both study years, only one offered the same, while eight lowered their offer and three raised their offer (figure 8.3). There were significant distributional differences, however, at the village level, despite the insignificant M-W and median tests (table 8.1, row 1). For example, in 2000 there were no offers of 20 percent or less, while in 2002 half of the sample gave 20 percent or less. Some 17 percent of the offers in 2000 were at 40 percent or higher, whereas 37 percent were at this level in 2002. If their experience in learning the game in 2000 helped players better understand the rules as well as how to earn the most money, we should expect less variance in offers in 2002. However, variance in offers actually increased from 2000 to 2002 (standard deviation = 8.2 in 2000 versus 15.5 in 2002). Regression analysis of sex and age on the difference given between 2002 and 2000 shows that men gave 18 percent less in 2002 ($p = 0.07$), and each additional year of age is associated with 0.82 percent ($p = 0.03$) more given ($F = 4.05$, R-squared = 0.47). Each year of education is associated with 3 percent less given, but this result is significant only at the 10 percent level. The strongest predictor is the household wealth of the player: every 100 Bs of wealth is associated with an offer decrease of 9 percent ($p = 0.002$, R-squared = 0.62) (7 percent controlling for sex and age). It is important to note that whether or not a person played the DG in 2000 shows no significant effect on DG offers in 2002. The *p*-values for the dummy variables on previous play are insignificant in both univariate analysis ($p = 0.90$) and when added to the reduced regression model 5 from table 8.2 ($p = 0.99$). Offers made by player 1s who played previously therefore were no different than those made by player 1s in 2002.

Results: The Strategy Method Ultimatum Game

Figure 8.2 shows the distribution of offers made by proposers in the strategy method UG. The mean, median, and modal offers were 26, 30, and 20 percent, respectively. Two-thirds of the offers were between 20 and 30 percent. Only 8 percent offered half of the 20 Bs stake. Table 8.1 compares the means, medians, and distributions of strategy method UG offers with those from the UG played in 1999 in five separate Tsimane' villages and the pooled UG samples. The strategy method UG is significantly different from the pooled 1999 sample and three of the five villages, using all three statistical tests. It is only similar to the UG offers in a village farther upstream, Catumare, and a village near San Borja, La Pampita. The pattern of strategy method UG offers was also indistinguishable from the offers in a sample of Machiguenga, a group of Peruvian forager-horticulturalists similar to the Tsimane' (Henrich 2000).

The mean offer given on the first play day was 30.0 percent (N = 6). On day 2 the mean offer was 28.3 percent (N = 23) for session 1 and 21.4 percent (N = 7) for session 2. The mean from this last session was only marginally significantly different from the means of the first two sessions ($p = 0.14$, $p = 0.10$, respectively; M-W). The order of play tracks these sessions and is significantly associated with a small decrease in offers ($r = 0.35$, $p = 0.04$). However, there is no order effect for day 1 or session 1 of day 2 (see also chapter 3). The decrease in offers with order of play is due to the same group of people who gave less on the second day of the DG. Unlike in the DG, however, session or order is not significant in stepwise regressions including the other predictors described here. There are no significant differences between the mean minimum accepted offers made across sessions (7.1 percent [N = 7], 6.2 percent [N = 21], 8.0 percent [N = 5], $p = 0.70$; Kruskal-Wallis test).

Predictors of Strategy Method Ultimatum Game Offers

Table 8.3 shows the regression results examining the effects on strategy method UG offers of the same set of independent variables examined with respect to DG offers (see table 8.2; see figure 8.1 for histograms for these variables). The only significant predictors of offers are individual annual income and household size. As in the DG, the linear effect of income is statistically insignificant, yet income shows a significant quadratic effect on offers. Thus, intermediate annual income is associated with higher UG offers

than low or high income. Those who earned more than 4,000 Bs a year gave 0.8 percent less for each additional 100 Bs they earned, while each additional 100 Bs earned up to 2,000 Bs was associated with a 0.4 percent increase in offers. Although not a market-oriented measure, household size acts as a proxy for household demand for resources because larger households have more mouths to feed. Yet each additional member in the household was associated with 1 percent *more* given away. Each standard-deviation-unit increase is associated with a 4 to 5 percent increase in offers. Income accounts for 13 percent and household size for 20 percent of the variance, while the multivariate model accounts for 22 percent of the adjusted variance in offers.

TABLE 8.3 *Linear Regressions of Tsimane' Ultimatum Game Offers*

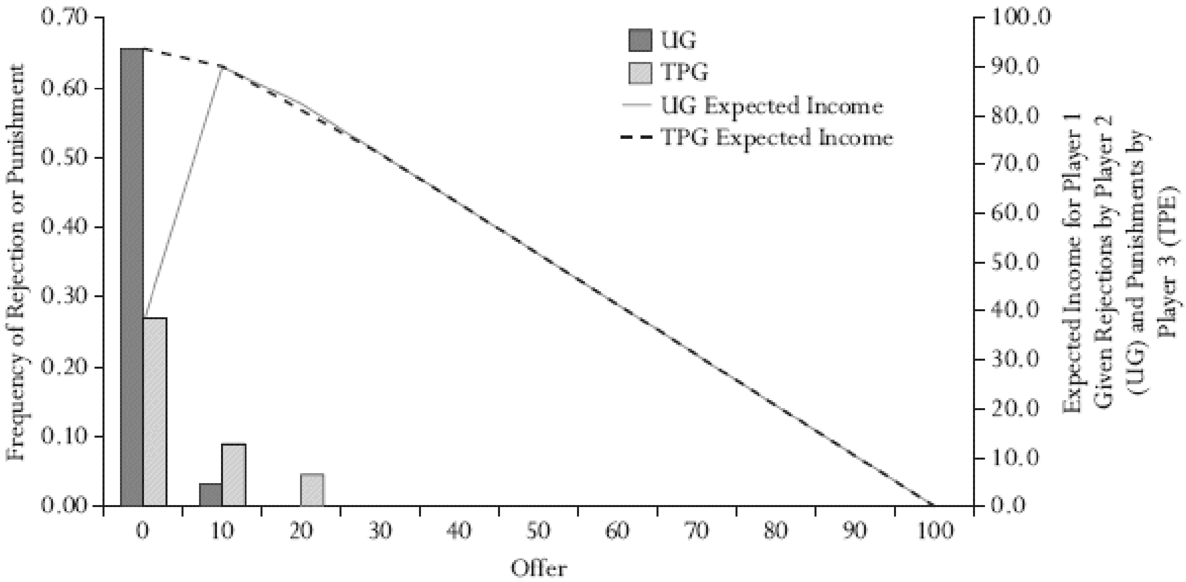
Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	−2.13				
	(1.93)				
Female	2.70	2.92			
	(2.30)	(2.30)			
Education	−0.38	0.29	−0.55		
	(2.20)	(2.12)	(2.04)		
Individual income	15.32**	14.88**	10.91	10.57	11.03*
	(7.54)	(7.56)	(6.96)	(6.73)	(6.11)
Household wealth	2.58	2.13	1.49	1.52	
	(2.10)	(2.06)	(2.02)	(1.99)	
Household size	3.97*	4.16**	4.73**	4.74**	4.61**
	(1.97)	(1.97)	(1.94)	(1.91)	(1.74)
Individual income-squared	−4.09**	−3.89*	−3.11	−3.05	−3.36*
	(2.05)	(2.06)	(1.98)	(1.94)	(1.79)
Constant	13.86**	8.20	12.88**	12.47**	15.57**
Observations	32	32	32	32	34
Model significance	0.060	0.052	0.051	0.025	0.013
Adjusted R-squared	0.22	0.21	0.20	0.22	0.22

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

Predictors of Strategy Method Ultimatum Game Minimum Acceptable Offers

No actual offers were rejected in the strategy method UG, and the strategy method does not provide much evidence that there is punitive sentiment toward low hypothetical offers. All hypothetical offers of 20 percent or higher were unanimously accepted, and only one of thirty-three player 2s rejected an offer of 10 percent. Interestingly, only twenty-one of the thirty-three player 2s (or 64 percent) said that they would reject offers of nothing! Thus, 36 percent of player 2s would accept no money in the game. Although a self-interested money-maximizer should accept any positive offer, there is no absolute gain from accepting a null offer, and a definite loss in terms of relative payoffs. Given the empirical pattern of acceptances and rejections for all offers, the income-maximizing offer (IMO) for Tsimane' player 1s is 10 percent (figure 8.4). This offer yields an expected 17.5 Bs (87.3 percent of the stake), with only a 2.7 percent loss. On average, Tsimane' player 1s offer more than the IMO. Only 11 percent of player 1s offered 10 percent of the stake. If offers were made in coordination with expected player 2 behavior, then there should be a positive correlation between the amount of expected income generated from a specific offer and the proportion of player 1s making that specific offer. The Pearson correlation is 0.77 (p = 0.006) when all possible offers (including those above 50 percent) are considered. If we restrict the analysis to the set of offers of 50 percent and below, the correlation drops to 0.65 and loses statistical significance (p = 0.16).

FIGURE 8.4 *Rejection, Punishment, and Expected Income in the Ultimatum Game and the Third-Party Punishment Game*



Source: Author's figure based on author data.

Regression analyses examine the potential explanatory power of the set of predictors tested in the prior analyses of DG and UG offers on the minimum acceptable offer (MinAO) elicited from the strategy method (table 8.4). The proportion of land devoted to cash-cropping and linguistic competence in Spanish showed significant effects in model 1 and so are included in the analyses. Figure 8.4 displays histograms of the independent variables. Even though only offers of 0 percent and 10 percent met with rejections, there are still significant effects. Model 1 reveals that males, the least-skilled Spanish speakers, people from less wealthy and larger families, and those with a greater percentage of their land devoted to cash crops were all more likely to reject a lower offer. Household wealth shows a quadratic effect: those of intermediate wealth are predicted to accept offers as low as 4 percent, whereas members of the poorest and wealthiest families will not accept offers below 10 percent. Only household size and cash-cropping land show robust results across all models in table 8.4. Household wealth is nearly robust, but loses significance in model 4. Each standard-deviation-unit increase in land percentage devoted to cash-cropping and household wealth is associated with a 3 percent and 2 percent higher MinAO, respectively. A comparison of standardized estimates reveals that sex,

household size, and the percentage of cash-cropping land have equal predictive power with respect to the MinAO. A maximum of 45 percent of the adjusted variance in MinAOs is explained by these models.

TABLE 8.4 *Linear Regressions of Tsimane' Ultimatum Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	0.85			
	(1.11)			
Female	−1.85	−2.32**		
	(1.29)	(1.12)		
Education	2.69**	2.28**	2.01	1.88
	(1.24)	(1.11)	(1.19)	(1.28)
Individual income	1.98	1.61	2.36**	
	(1.22)	(1.11)	(1.13)	
Household wealth	−9.21**	−8.04**	−7.81*	−6.53
	(4.11)	(3.77)	(4.08)	(4.36)
Household size	1.94*	1.79*	1.50	2.45**
	(1.08)	(1.05)	(1.12)	(1.11)
Household wealth-squared	8.00*	6.72*	6.71*	5.44
	(3.94)	(3.53)	(3.82)	(4.07)
Proportion of land devoted to cash-cropping (hectares)	3.01**	2.97**	2.54**	2.67**
	(1.13)	(1.12)	(1.19)	(1.29)
Competency in Spanish language	−2.60*	−2.69*	−1.00	−0.85
	(1.43)	(1.41)	(1.24)	(1.34)
Constant	6.12	9.13**	5.02	3.65
Observations	26	26	26	26
Model significance	0.016	0.009	0.022	0.055
Adjusted R-squared	0.45	0.46	0.37	0.26

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

Comparison of Dictator Game and Strategy Method Ultimatum Game Offers

Because the same individuals acted as player 1s in both the DG and the strategy method UG, we can compare offers to examine whether they were similar across games (figure 8.4). On average, the same people (N = 36) gave 1.9 percent more in the UG than in the DG. Of the thirty-six player 1s who played both games, nine gave the same amount, fifteen gave more in

the UG, and twelve gave more in the DG. A Wilcoxon signed rank test on paired offers reveals no significant difference in mean offers across games (p = 0.52; see table 8.1). Additionally, there is a significant positive correlation between offers in the DG and UG (Pearson's $r = 0.38$; $p = 0.02$). The more stringent Epps-Singleton test, which compares distributional shapes and does not account for the lack of independence between games, shows a significant difference across games ($p = 0.04$; see table 8.1). Linear regression analysis on the difference between UG and DG offers reveals that player 1s from larger and wealthier households gave more in the UG than in the DG, even though household wealth, as shown earlier, is associated with lower offers in the DG.

The Matching Game

The matching game (MG) examines people's ability to converge on common focal points with other community members. In the MG on game animals, 32 percent of the sample converged on tapir (shi'), 25 percent on red brocket deer (ñej), and 15 percent on collared peccary (quiti'varej). Hunting is not so common an activity in Cosincho, where the majority of animals encountered are small monkeys, birds, and coatis. Tapir is the rarest and largest animal in South America. For the MG on plants and trees, 40 percent of the sample converged on mahogany (tyura', *Swietenia macrophylla),* and 17 percent on almendrillo (cojma, *Dipteryx odorata*). Less than 10 percent of the sample converged on each of the remaining responses. In total, there were nine animal and seventeen plant responses. My catalog of forest resources includes 43 animals and 428 plants or trees. Thus, Tsimane' converge on 21 percent of the animals and 4 percent of the plants that have been documented by both myself and others.

If modal responses in the DG are construed as perhaps more representative of group norms, then we can examine whether those individuals who are best at guessing what most others will say in the MG are also more likely to give the modal response in the DG. If those who perform best at the MG are better able to predict the behaviors or actions of other group members, then they should also be more likely to offer the income-maximizing offer in the strategy method UG. Neither of these predictions is borne out. There is no relationship between the percentage of others who offered the same amount in the DG and the percentage of others who also

said the same plant (r = 0.08, p = 0.70, N = 24) or animal (r = 0.11, p = 0.60, N = 24) in the MG. There was also no relationship between the expected income from the offer (given the observed pattern of rejections; see figure 8.4) made in the UG and the percentage of others who also said the same plant (r = 0.07, p = 0.77, N = 23) or animal (r = 0.17, p = 0.43, N = 23) in the MG. Thus, those who performed the best in the MGs did not make offers closest to the mode in the DG or to the IMO in the UG.

THE THIRD-PARTY PUNISHMENT GAME

The Study Village: Fátima

The third-party punishment game (TPG) was played in Fátima, located about seventy kilometers upstream on the Maniqui River, or up to a four-day river journey.[3] A different village was used for the TPG because of the large sample of subjects required to play the game. At the time of the TPG, Fátima had 444 residents, making it one of the largest Tsimane' villages.[4] Fátima was chosen for the TPG because of the large population and because economic games had never been played there before. Like Cosincho, much of the village is also located in the interior, along the smaller Chimanes River. Fátima is home to a well-organized Catholic mission, which flourished under the stewardship of the Alsatian father Martín Bauer in the 1950s. He attracted Tsimane' from other parts of the Maniqui region to congregate and live near the mission. In its current form, much of the village is highly dispersed along the Chimanes River. It is at least a half-day's journey from the mouth of the Chimanes River to where it reaches the last household. At least half of the village congregates routinely at the weekly Sunday masses. After Father Martín's death in 1997, the only Tsimane' “priest” was given charge of the mission, with occasional assistance from Bolivian priests who arrived by airplane during bimonthly visits via a small airstrip near the mission. Father Martín had struggled against river merchants and loggers and had strongly discouraged the village residents from interacting with them. The majority of agricultural production traded or sold was, and still is, purchased by the mission at a reasonable price, rather than by the merchants. In recent years, river merchants and loggers have started to revisit the region.

Methods

The TPG protocol followed the adapted standard version translated into Spanish by Clark Barrett. Villagers were given initial notice about the game at the conclusion of mass one week prior to the games, and then reminded during frequent household visits and by word of mouth. The TPG was played after a Sunday service in June 2003. Over ninety individuals had congregated to listen to the rules of the game. Following the procedure outlined earlier, the game was explained in one hour. Players then entered a private area inside the mission courtyard, one by one. Game rules were explained again, test questions were given, and rules were re-explained until the test questions were answered correctly. The total sample size for the TPG was seventy-three (twenty-seven player 1s, twenty-three player 2s, and twenty-three player 3s). It took five and a half hours for sixty-three Tsimane' to play the game on the first play day. On day 2, it took one and a half hours for an additional eleven people to play. All players were paid at the end of the second day, as well as the day after the game was over. There was no significant effect of day of play on the offers made (19.6 percent on day 1 [N = 23], 22.5 percent on day 2 [N = 4], p = 0.76, M-W) or on the minimum accepted offer (4.2 percent on day 1 [N = 19] versus 2.5 percent on day 2 [N = 4], p = 0.60, M-W) (see chapter 3). There was also no effect of order of play and offer (r = 0.03, p = 0.88).

Predictor Variables

Time constraints and the lack of a concurrent anthropological project in Fátima prevented the collection of market-oriented variables, as was done in Cosincho. During brief interviews with players after payment, however, I asked about prior visits to market towns over the previous two months and about the total number of arrobas (about twelve kilograms) of rice they had sold, either to the mission or in San Borja. Rice is a principal cash crop and so can be used to roughly estimate the amount of land devoted to cash-cropping. We did collect demographic data in the same manner as was done in Cosincho. Histograms of these predictor variables are shown in figure 8.5.

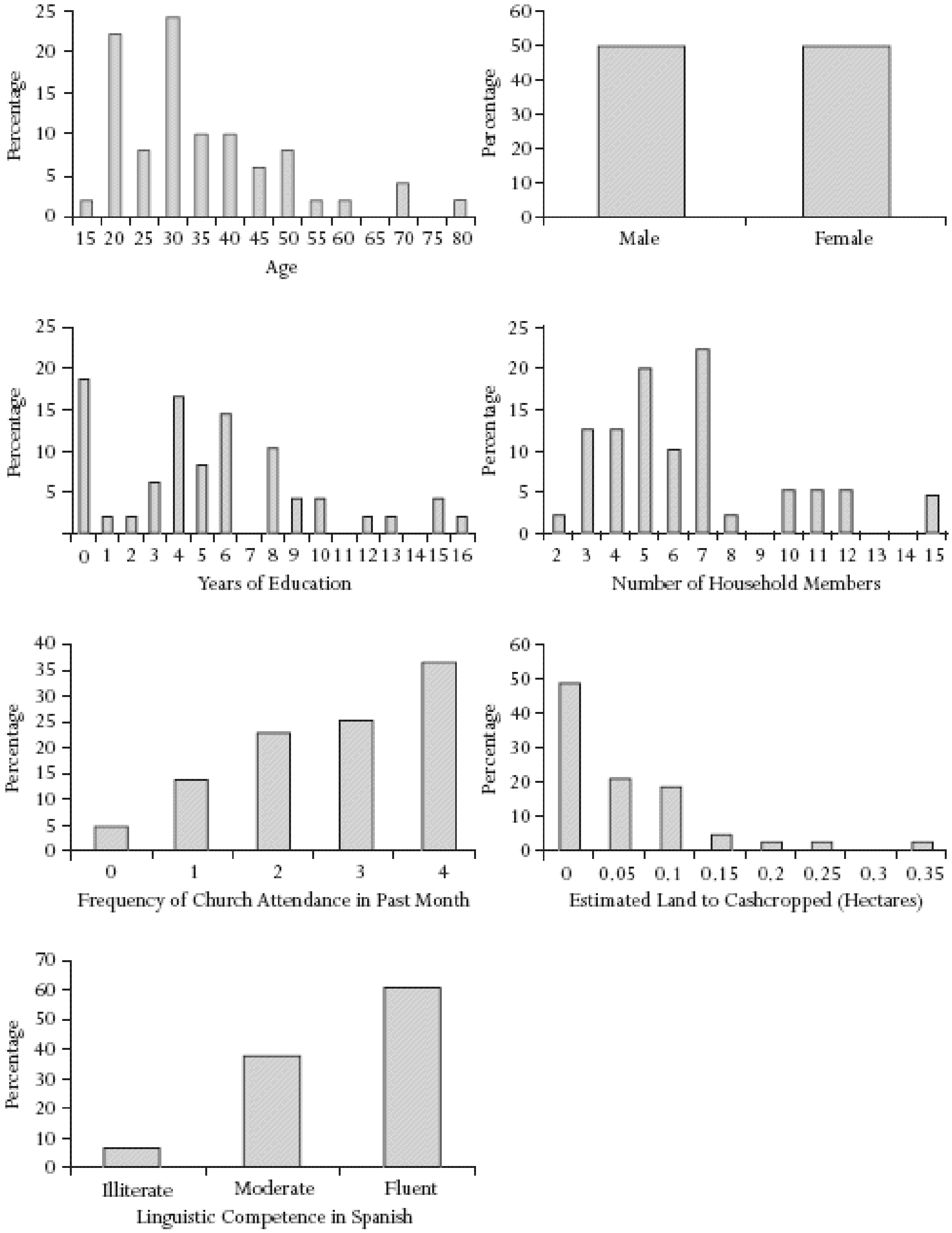
Results: The Third-Party Punishment Game

Figure 8.2 shows the distribution of offers in the TPG. Mean, median, and modal offers were 20, 20, and 10 percent, respectively. Neither the Mann-Whitney nor the Epps-Singleton test reveals significant differences between TPG offers in Fátima and DG offers in Cosincho (table 8.2). A comparison of the TPG offers in Fátima with those from a sample in Berlin, Germany (from Fehr and Fischbacher [2004]) also reveals no significant differences using both statistical tests (table 8.1).

Predictors of Third-Party Punishment Game Offers

Table 8.5 shows the regression results examining the effects of predictor variables on TPG offers. Figure 8.5 shows the histograms of the distribution of predictor variables from the sample of players 1 and 3. None of the demographic or acculturation variables are significant predictors of TPG offers in models 1 to 3, probably owing in part to the small sample size. In reduced models, Spanish ability and frequency of attendance at weekly church services over the previous month (range: zero to four) are significant. When analyzed together, each additional church visit is associated with giving 5 to 7 percent more, while the most fluent in Spanish gave 8 percent less than the non-Spanish-speaking. Fluency in Spanish is associated with increased church attendance ($r = 0.30$, $p < 0.05$). Using non-normalized parameter estimates, fluent Spanish speakers who went to church 3.2 times in the previous month gave an average of 15 percent, while non-speakers who went to church 2.5 times in the previous month gave an average of 22 percent. This model accounts for 13 percent of the adjusted variance in TPG offers.

FIGURE 8.5 *Predictor Variables for Third-Party Punishment Game Offers by the Tsimane'*



Source: Author's figure based on author data.

TABLE 8.5 *Linear Regressions of Tsimane' Third-Party Punishment Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	1.20					
	(4.85)					
Female	−2.06	−2.45				
	(4.00)	(3.55)				
Education	0.83	0.45	0.09			
	(4.28)	(3.82)	(3.71)			
Household size	3.12	2.50	2.52	2.69		
	(5.25)	(4.40)	(4.31)	(3.59)		
Frequency of church attendance in past month	6.72	7.10	6.89	6.96**	6.45**	4.85*
	(4.81)	(4.36)	(4.25)	(3.37)	(3.00)	(2.62)
Amount of land devoted to cash-cropping (hectares)	2.05	2.28	2.13	2.08	1.25	
	(3.84)	(3.57)	(3.49)	(3.07)	(2.84)	
Competency in Spanish language	−4.71	−4.81	−4.06	−3.98	−4.04	−4.91*
	(4.58)	(4.36)	(4.13)	(3.19)	(2.93)	(2.75)
Constant	0.33	3.98	1.43	0.84	8.77	15.04**
Observations	17	17	17	17	17	17
Model significance	0.760	0.638	0.564	0.268	0.162	0.094
Adjusted R-squared	−0.21	−0.11	−0.06	0.09	0.12	0.13

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

Predictors of Third-Party Punishment Game Minimum Accepted Offers

Out of twenty-three offers that could have been punished, three were met with punishment by third parties.[5] Two of these were offers of 10 percent, and one was an offer of 0 percent. No player 3s said that they would punish an offer of 30 percent or greater. One player (4 percent) said that he would punish someone who offered 20 percent. This individual was an educated person with significant contact with outsiders. Two individuals (9 percent) said that they would punish those who offered 10 percent, and six (26 percent) said that they would punish those who offered nothing. Given the pattern of third-party punishment, the income-maximizing offer was 10 percent (figure 8.4). Thirty-seven percent of TPG player 1s offered this amount. The Pearson correlation between expected income from an offer and the proportion of player 1s making that offer is 0.58 (p = 0.06). Restricting

the set of possible offers from 0 to 50 percent increases the correlation to 0.69, but reduces the significance level (p = 0.13).

TABLE 8.6 *Linear Regressions of Tsimane' Third-Party Punishment Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	−0.15				
	(2.61)				
Female	−1.85	−1.87			
	(3.30)	(3.14)			
Education	−3.46	−3.35	−2.63		
	(3.92)	(3.28)	(2.96)		
Household size	1.00	0.91	0.69	−1.27	
	(3.07)	(3.26)	(3.15)	(2.23)	
Frequency of church attendance in past month	−1.17	−1.18	−1.88	−1.60	−1.63
	(3.07)	(2.92)	(2.60)	(2.56)	(2.50)
Amount of land devoted to cash-cropping (hectares)	−1.13	−1.13	−1.33	−1.59	−1.87
	(2.42)	(2.30)	(2.22)	(2.18)	(2.08)
Competency in Spanish language	1.02	0.93	2.14	1.23	1.38
	(3.82)	(3.35)	(2.59)	(2.36)	(2.29)
Constant	8.67	8.63	2.92	5.52	2.76
Observations	17	17	17	17	17
Model significance	0.938	0.874	0.830	0.856	0.795
Adjusted R-squared	−0.40	−0.28	−0.21	−0.19	−0.13

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

Regression analysis on MinAOs using the same predictor variables as used earlier does not reveal any statistically significant effects in any of the regression analyses shown in table 8.6.

SUMMARY

Several important findings emerged from these game experiments with the Tsimane' in 2002:

1. The patterns that emerge from these dictator game and ultimatum game experiments are similar to those found in previous experiments that used a different protocol and methodology. Tsimane' UG results are also similar to the results reported by Joseph Henrich (2000) for the Machiguenga, who show many ethnographic similarities to the Tsimane' (Johnson 2003).

2. Both second-party and third-party punishment are rare. Consistent with this general lack of punishment, player 1 offers were very similar across the three games. Despite the overall low rate of rejection, being male, educated, a cash-cropper, and a resident of a larger and less wealthy household are all associated with a greater tendency to reject the lowest offers in the strategy method UG.

3. Income had an inverted U-shaped effect on offers in the DG and UG. Those with greater household wealth gave less in the DG. Members of larger households gave more in the UG.

4. Sex, education, and Spanish ability had no effect on offers in the DG and UG games.

5. A repeat of the DG in Cosincho revealed lower offers in 2002 than in 2000. Being male, younger, educated, and wealthier were all associated with a greater tendency to give less in 2002. However, those who played in 2000 did not play differently from those who, in 2002, had never played the DG before.

6. The distribution of UG offers is different than that of several other Tsimane' villages studied in 2000.

7. Offers made by the same people were similar across the DG and UG, but significant distributional differences remain.

8. Those who were adept at guessing common plants and animals were not more likely to give modal offers or income-maximizing offers in the DG or the UG.

DISCUSSION AND CONCLUSIONS

What Have We Learned About Norm Salience and Market Influence?

There are a variety of ways by which market integration and acculturation can affect social norms and lead to cross-cultural discrepancies in game behavior. First, in large societies, interaction with outsiders and anonymous others ("strangers") who have no common history or close kinship may lead

to less daily cooperation, but also to a greater emphasis on courtesy and etiquette. For example, experimental evidence supports the notion that score-keeping occurs more profoundly and explicitly with casual friends and strangers than with kin and close friends (Silk 2003). Second, familiarity with a competitive, money-based market system, perhaps in combination with etiquette norms, may be associated with norms of fairness and equality (see chapter 2). If money is a novel currency, then more familiarity with and appreciation of the value (and rarity) of money may produce more selfish behavior. If money is instead viewed as just another type of resource, then it may not lead to any differences in game behavior. Third, formal education in a classroom often emphasizes the importance not only of information and linguistic competence but also of rules and structure for interacting in national society. Exposure to formal education may thus favor more prosocial norms. Fourth, individualistic entrepreneurship may couple with market integration to produce ambiguous outcomes. The norms that emerge may either emulate Western-style norms or diverge from them if those actively seeking out the market tend also to be more “selfish.”

Thus, none of these components of “modernization” necessarily produces Western-style game behavior. Even in samples in industrialized societies, framing and anonymity matter in the DG (Hoffman, McCabe, and Smith 1996), and the few nonstudent samples studied have shown different behavior in the DG (Carpenter, Burks, and Verhoogen 2004; Henrich and Henrich 2007; see also chapter 18, this volume, available at http://www.russellsage.org/Ensminger). Similarly, an increasing body of work is showing that market integration can have both positive and negative effects on other features of people's lives, such as deforestation, health, and indigenous knowledge (Godoy 2001). For example, markets foster new kinds of wealth that can improve nutrition, but as opportunities for wealth and spending increase, some individuals choose to spend much of their income on more status-oriented goods that do not have a positive impact on the health or general welfare of their families, and this income usually is earned at a cost to other investments in family and community.

The market and demographic variables analyzed in this chapter are proxies that tie into several domains of modernization. For example, fluent Spanish speakers most likely received formal schooling, engage in wage labor, and make frequent visits to town to purchase or trade items or attend the occasional educational workshop. It is appropriate that Spanish ability is

correlated with the greatest number of other acculturation-oriented variables. While Spanish competency and visits to San Borja were positive predictors of offers in prior ultimatum and dictator games (Gurven 2004b), these relationships do not consistently reappear in the multivariate analyses presented here, nor are they consistent predictors in other studies (Henrich et al. 2005; Gurven et al. 2008). Spanish competency was negatively associated with offers in the TPG and mostly absent in the UG and DG as presented here. Income and per capita wealth showed significant nonlinear effects on offers in the UG and DG. Those with the highest incomes or wealth gave less, perhaps indicative of the entrepreneurship of the wealthiest few.[6] Indeed, the wealthiest were most likely to have reduced their DG offers over the two-year gap and to accept lower UG offers. As mentioned earlier, these effects may be indicative of self-selection on market behavior by the Tsimane'. Wage labor was measured in days spent in labor, not in total earnings, in the earlier study (Gurven 2004a), which saw no effect on UG offers. The market contributions to the diet did not predict anything in the current analyses, although they positively predicted UG offers and negatively predicted DG offers in earlier games that used a cruder, shorter-term measure of diet composition (Gurven 2004a).

One problem with acculturation variables is the potential for high measurement error given the relatively short time frames over which they are measured. This study has tried to avoid some pitfalls of one-shot interviews about behavior or activities in the past week or past month (see the methods described in chapter 3) by examining behavior over a year's duration. The longest-term effects can probably be observed with Spanish literacy and years of education, whereas market contributions to diet, visits to San Borja, cash-cropping, income, and wealth can all fluctuate both seasonally and annually. It is not clear a priori whether short-term or long-term salience should be a better predictor of game behavior. Norm internalization may require long-term exposure, but the salience of, say, a recent trip to San Borja may also carry weight in the minds of players.

Why do the Tsimane' Punish So Little?

There was little evidence of second-party or third-party punishment in the UG and TPG, in marked contrast to results in samples from industrialized societies and in several other cross-cultural samples (see, for example,

chapter 6, this volume, available at: http://www.russellsage.org/Ensminger). Although rates of punishment tend to be lower when a strategy method is employed (Brosig, Weimann, and Yang 2003; Oxoby and McLeish 2004), the absence of overt punishment may be more common than previously thought. The same result was found in all of the UGs played among the Tsimane' in 1999, as well as in those played among the Ache (Hill and Gurven 2004), Achuar (Patton 2004), Machiguenga (Henrich 2000), and Igbo (Gowdy, Iorguelscu, and Onyeiwu 2003). If moderate to high levels of second-party or third-party punishment are required to maintain prosocial norms, then why is the punishment of low offers not a more universal phenomenon in these groups?

Punishment of true norm violations does occur in these groups, so the absence of punishment in the games does not mean that punishment does not exist in the social world of these groups. Several examples from the Tsimane' and Ache illustrate the point. After being ignored several times during meat distributions by a hunting partner, one Tsimane' man refused to go hunting or to share with that individual until he changed his behavior. Another Tsimane' man, upon the disclosure of his infidelity with an outsider, was beaten by male members of his wife's family. Similarly, accusations of stealing sometimes result in verbal or physical violence against perpetrators among Tsimane'. An Ache woman who had lived in Paraguayan society, trained as a schoolteacher, and now received a steady income saw her house burned down, along with all of her possessions, by envious others. Another young Ache woman who worked as a prostitute in Paraguayan society was subjected to having her head shaved to publicly display her transgression.

These cases connote clear transgressions of local norms, whereas the economic games do not. Receiving little from another person is unpleasant, but it may not necessarily be viewed as particularly "unfair" and therefore does not elicit punishment (for a similar argument, see Fehr and Fischbacher 2002). Four of ten individuals interviewed after the DG and three of nine after the UG said that the games did not remind them of anything in their daily lives. There is little precedent for fifty-fifty-split offers in many domains of Tsimane' social life, beyond distribution rules for wild game among hunters. Only one person reported giving half in the UG so that "the other person wouldn't be sad." In informal interviews about distribution rules for a wide variety of resources, people commonly reported that "you can give what you want," emphasizing individual choice. Thus, the fact that the

games elicited little punishment may not be so strange. Additionally, the setup of the games does not mimic any kind of traditional system, in most of which the rules governing distribution are tied to systems of production that incorporate labor or capital inputs (Gurven 2004a, 2004c; Güth 1994; Kaplan and Gurven 2004). Instead, the games provide arbitrary windfalls received as manna from heaven. In a DG in which the stake was earned based on performance on a quiz, U.S. undergraduates offered very little to others (Cherry, Frykblom, and Shogren 2002). In another study, in a series of clever experiments, differential inputs or costs incurred explained twice as many UG offers as the equality norm when stakes were produced through joint production decisions (Königstein 2000, table 1.4). Those more likely to punish may therefore not be representative of most people. In the current study, the highest offer rejection (20 percent) was in the TPG, and it was made by only one person.

Despite the examples of confrontational behavior mentioned earlier, the Tsimane' generally avoid confrontation and are not overly eager to establish reputations as norm-enforcers (Gurven et al. 2008). After severe incidents, such as murder, the perpetrator usually “escapes” and moves to a different community in a distant region of the Tsimane' territory. If the murderer returns years later, that person is not always formally punished, but may be ignored and avoided by a majority of the community. If disgruntled with an individual, Tsimane' usually gossip about the transgression and through word-of-mouth hope to induce a change in behavior. If this is unsuccessful, Tsimane' ignore or avoid interaction with the transgressor (they may do this anyway), which is often not difficult owing to the dispersed layout of the villages. Grievances are often voiced during public drinking festivals, which can result in either an alleviation of conflict or an eruption of physical violence. Individuals in conflict often resolve their differences, but frequently one or both leaves the village, either temporarily or permanently. Thus, even if individuals were annoyed or upset with the prospect of receiving or having others receive low offers, they were not provoked enough to impose a punishment that carried a monetary cost.

Two other possibilities are considered in Gurven (2004a) and Hill and Gurven (2004). Even though the identities of players are anonymous, some players may believe that offer rejection will stir discontent in their small community, where people need to live with each other long after the games are over. This seems unlikely among Tsimane', however, considering that

many did not care if others were present while they received their payment. There is also the possibility that the cost of rejecting offers is too high, given the scarcity of wage labor and hence money. It remains to be seen whether the UG or TPG played with a more locally abundant alternative currency might invoke a higher rate of rejections.

Why Are Results Different Across Villages and Even in the Same Village over Time?

An interesting finding is that player 1 behavior in the DG differed more from the pattern of player 1 behavior in the same village two years earlier than from that observed among other similar, traditional populations such as the Hadza and Machiguenga. Similarly, strategy method UG proposals differed substantially from several of the UG samples from 1999. What can account for the relatively high degree of intracultural and even intravillage variation in game behavior?

One hypothesis is that differences in player 1 behavior across villages are real and reflect variation in norms. No obvious differences in norms exist across all villages, although there are definitely obvious differences in communality, personalities, and recent histories of interpersonal conflict. Some of these differences may be due to variation in group size, shared history, kinship, and the extent of exploitation by loggers, merchants, and encroachers. A study of DG behavior in nine Tsimane' villages shows that residents were reasonably able to identify giving patterns in their home villages and that offers tended to reflect village patterns of morally appropriate or fair offers. However, village membership was still highly significant after controlling for these expectations. No village effect (for example, encroachment by outsiders, distance to market, population size, village dispersion) was more significant than village membership (Gurven et al. 2008).

A second hypothesis is that learning or practice is required for game behavior to be “representative” of an individual's preferences because Tsimane' have no experience playing economic games, and thus differences in first-run games played in different villages may reflect confusion by at least some proportion of village members. Two related ideas are that players conceptualize the games differently and that the same individuals may change the way they view the same game via learning effects. For example,

minimal observation of another pair showed a significant decrease in UG offers over repeated rounds in a U.S. sample (Duffy and Feltovich 1999), although this and most studies report only mean offers over time. Repeat offers over multiple rounds in an ultimate game conducted in Germany decreased somewhat, then converged (Königstein 2000). Support for a learning effect comes from Cosincho, where the mean DG offer decreased from 32 percent in 2000 to 26 percent in 2002. An altered DG played exclusively among women using plastic beads as the currency showed a further decrease in offers (Rucas et al. 2010). The game was played in four villages, and women in Cosincho gave an average of only 16 percent of the beads to another woman. This was less than women gave in the other three villages (combined average of 34 percent). This game was played in 2002 after the DG reported here, but with a different methodology, and so is not directly comparable to the DG.

Informal follow-up interviews did reveal a variety of ways to interpret the games. As mentioned earlier, several people said that the DG and UG did not remind them of anything in their lives. Others remarked that these games reminded them of loggers' failed promises to pay for wood extraction, of “river merchants who offer low because they can,” and of the gifting of fish, meat, or money to other Tsimane'. One informant said the UG reminded him of the craps games he saw played on the streets in San Borja. Regardless of these anecdotes, the learning hypothesis is unlikely to explain the inter- and intravillage game behavior variation because all players answered test questions correctly, the variance in DG offers increased in the repeat play, and game behavior was systematically associated with several predictors unrelated to learning.[7]

A third hypothesis is that the differences are real and reflect differences in unmeasured state variables that can lead to variable levels of prosociality (for example, an immediate need for money, impatience, changed social relations with group members). This would explain both the intra- and intervillage differences. For this to be true, it would have to be shown that Tsimane' are more whimsical, or more easily influenced, than players in other cultures who show more similar patterns, or that among the Tsimane' the absence of any obvious norms applied to the games means that individual-level factors carry more psychological weight.

Because Tsimane' villages have no strong social norms governing a specific form or level of resource distribution (and little evidence for overt

punishment), some of the behavioral differences in these experiments may instead reflect current "moods" of small groups of people who interact frequently rather than distinct, stable subgroup conventions or norms (Gurven et al. 2008). The "flavor" or character of specific villages based on their history of past interactions became more apparent to me after extensive village visits, and I suspect that certain events in some villages, such as community meetings, drinking parties, and soccer games, often act to shift the mood in a more prosocial direction. Grievances against perceived troublemakers are likely to be voiced at these group events. These events may be the cultural equivalent of boosting contributions in repeated public goods games by reshuffling players or by allowing some punishment, thereby acting to erase past grievances with known defectors and start interacting again with a higher level of cooperation (even if levels may dwindle again later). The lack of strong social norms regarding distributions and the lack of clear punishment of stingy behavior allow local moods or flavors to dominate social interactions, whereas these same moods or flavors may be swamped by adherence to strong social conventions in Western industrialized societies.

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NOTES

1. I do not report the frequency of trading goods for purchase or resale because this level of integration is extremely rare, and therefore this variable is uninformative.

2. This quadratic effect is not due to a single outlier. There were at least three low offers made by high-income player 1s. Without these three points, income is marginally statistically significant ($p = 0.06$). However, this effect is driven by two other outliers, without which income shows no significant effect. For these reasons, I leave all data points in the analysis of DG and UG offers.

3. Cosincho and Fátima are connected by means of a poorly maintained, four-hour trail. By river, Fátima is up to a day's journey upstream from Cosincho.

4. Technically, the village of Ijnanarej is part of Fátima, although members live on the opposite side of the Maniqui some distance from the rest of Fátima. Residents of Ijnanarej only sporadically visit the mission for mass or for social visitation. Inclusion of Ijnanarej puts the census of Fátima at 469.

5. Several players left the game scene before playing, and so several player 1s were not paired with third parties.

6. Only four player 1s in the UG and DG had annual incomes estimated at over 3,000 Bs.

7. In a study designed to estimate the rate of time-discounting among the Tsimane', Godoy and his colleagues employed repeat trials of a task once every three months over the course of a year and a half (Kirby et al. 2002). The first several trials showed little intra-individual correlation, although subsequent trials proved to be more stable (Ricardo Godoy, personal communication, 2004).

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Chapter 9

Fairness Without Punishment: Behavioral Experiments in the Yasawa Islands, Fiji

Joseph Henrich and Natalie Henrich

This chapter reports results from three behavioral experiments done in the villages of Teci and Dalomo on Yasawa Island in Fiji. We performed the dictator game (DG), the strategy method ultimatum game (UG), and the third-party punishment game (TPG), as explained in chapter 3. For comparison to an established reference population, we also performed an identical set of experiments among U.S. undergraduates at Emory University in Atlanta, Georgia. Five major results emerged from these behavioral experiments:

1. Yasawans are substantially less willing to punish in both the UG and TPG than Emory students. Most Yasawans, for example, accepted offers of zero in the UG, while all Emory students rejected offers of zero.
2. However, despite their lack of willingness to punish, Yasawans still made relatively equitable offers, though means are lower than among the students, whose offers appeared to be motivated by the threat of punishment.
3. We find some evidence for a “U-shape” in the distribution of rejections across offers in the UG (that is, rejections of both low *and* high offers), although the effect is quite muted compared to most other populations detailed in this volume and elsewhere (Henrich et al. 2006).
4. We find little evidence supporting an effect of market integration within this sample or any important effect of demographic or economic variables on game behavior. However, in combination with DG offers (as a predictor variable), sex and wealth can predict 90 percent of the variation in UG offers.

5. Our analyses also fail to show that social status, centrality in the social network, and kinship (average relatedness) are important predictors of game behavior.

We begin by describing the ethnographic context and then lay out the ways in which our methodology deviates from that described in chapter 3. Next, we present the results from our three games and compare our results across games and subject pools. After summarizing our efforts to account for the individual variation in experimental behavior, we analyze the data on emotions and contextual interpretations of the game collected in our postgame interviews. Finally, we briefly discuss the ontogeny of social preferences, how the nature of daily village life might both reflect and transmit these preferences, and how dual inheritance theory contributes to a more synthetic evolutionary explanation of the social norms often measured by behavioral games (Chudek and Henrich 2010).

THE ETHNOGRAPHIC CONTEXT

The villages of Teci (pronounced “Tethee”) and Dalomo, with a combined population of about 210, are situated on the eastern shore of Yasawa Island in the northwestern corner of the Fijian archipelago. The village of Teci is about a fifteen-minute walk from Dalomo, a ninety-minute walk from Bukama, and a two-and-a-half-hour walk from Nabukaru. To travel to the city of Lautoka, on the main island of Viti Levu, most villagers use a cargo ship that takes between one and two days and makes the rounds on a monthly schedule. (This ship sank in 2010 and has not been replaced.) Although it is possible to take a five-hour ferry from a point in the central part of the Yasawan archipelago, the transportation to the ferry and the ferry ride itself cost considerably more than traveling on the cargo ship. Villagers also sometimes use small motorboats to cross the Bligh Waters to Lautoka, though this sometimes results in disasters and disappearances.

In the dry, deforested grasslands of this slender, twenty-two-kilometer-long island, economic life is based primarily on a combination of root-crop horticulture (yams and sweet manioc), littoral gathering (shellfish, mollusks), and fishing. Men bear the responsibility for clearing gardens (slashing and burning if necessary) and planting. Both men and women collect firewood, harvest agricultural products, and weed the gardens. Adults

of both sexes and children also engage in littoral gathering, although women do more of this than men or children. Fishing is done principally by men, especially young men, and mainly involves free-dive spear-fishing. Older men, women, and boys use hook and line. Men also use nets to catch both fish and turtles. Women bear the primary responsibility for food preparation, cooking, laundry, and cleaning.

Three main sociopolitical institutions govern village life: the traditional chiefly system, the government-instituted role of the Turaga ni koro, and the Christian churches. The most important of these institutions is the traditional system based on kinship, clans, and hereditary chiefs. Teci and Dalomo have five main mataqalis (pronounced “matangalees”), or clans, that together form a single yavusa. A yavusa is the largest territorial unit in the traditional Fijian system. Fijian villages often correspond, one to one, with a yavusa, with one chief per yavusa. However, Teci and Dalomo are part of the same yavusa, and there is a single chief for both villages. The chief lives in Teci, the older of the two villages. Leadership in each of the mataqalis is assigned primarily by age, gender, and descent, although skill and political acumen can also play a role. The head of the chiefly clan is officially installed as chief by one of the other mataqalis. The chief, together with the heads of the various mataqalis, makes decisions and deals with problems. At the time of our experiments, Teci's previous chief had only recently died, and his heir (his older brother's son) was still relatively young, so he had not yet been formally installed; nevertheless, he was still referred to as Tui Teci (Chief of Teci). At the time of our study, these villages were governed by a council of elders.

Now integrated, and operating in parallel with the traditional system, is the democratically elected Turaga ni koro (Gentleman/Head of the Village), who acts as the representative of the Fijian national government. Both Teci and Dalomo have their own Turaga ni koro. The Turaga ni koro's responsibilities are varied and include such tasks as dealing with visitors and keeping the village well-maintained. Though not an official part of their duties, the Dalomo Turaga ni koro operated the village radio-phone, and the family of Teci's Turaga ni koro operated a village store that sold basic foodstuffs.[1] In most matters we observed, the Turaga ni koro worked in concert with the council of elders and the chief, and all were seen as a unit.

Layered across these institutions, and supported by Teci and Dalomo, are three different Christian religious sects—the Methodist, Evangelical

Assemblies of God, and Seventh-Day Adventist Churches, in five separate congregations. These churches make numerous contributions to the villages, from organizing feasts to running youth groups.

Connections with the larger Fijian economy and municipal services are limited. There are no towns, and the only road on the island at the time of our visits was a dirt path that was used by an exclusive private resort near Bukama (the only resort on Yasawa Island).[2] There are few opportunities for wage labor. At the time of our experiments, the resort employed three people from Teci and Dalomo. There are three primary schools on the island, including one in Teci. For education beyond the eighth grade, which many have not pursued, students must go to live either on the island of Naviti, in the center of the Yasawa group, or to Viti Levu.

At the time of this research, there were three ways in which village families typically had access to market goods. First, several families maintained small supplies of flour, kava, yeast, sugar, salt, and other basic items, which they sold to their neighbors. Second, people traveled on the cargo ship—which came to Teci once a month during this period—to sell crabs, coconuts, mats, and other products in Lautoka and resupply on items like cooking oil and kerosene. Third, the private resort maintained a small shop where basic necessities could be purchased. Villagers did not make frequent use of this shop, owing to its high prices.

All residents of Teci and Dalomo over about age six speak both Teci (the local dialect) and Standard Fijian (developed from the Bauan dialect). The two dialects are mutually unintelligible. A few people also speak some English. Although English is officially taught in schools, only a few of the older schoolchildren had learned more than a few phrases. More extensive details on life in these Yasawan villages can be found in the supplemental materials of Henrich and Henrich (2010).

METHODS

All data were collected in June and July 2003. Each of the games was conducted according to the protocols detailed in chapter 3. Only the features that are unique to our experiments are described here. Our games were conducted over a four-week period, with four DG/UG sessions held on two consecutive days and three TPG sessions held on three consecutive days about two weeks later. Recruitment for all sessions followed the same

procedure. A list of all eligible participants in the two villages was generated and randomly ordered. The day before a game session, our field assistants recruited players by working down the list until the required number of players had been reached. Each player was given a slip of paper that stated the day, time, and location of the session. For subsequent sessions, people who had already played were removed from the list and the recruitment was repeated with the remaining eligible villagers. If a villager declined to participate, he or she was still included on the list for subsequent sessions. Often people who declined when first approached did so because they had a prior obligation or because they were hesitant to participate in this unknown activity (a reason that becomes important later). Recruitment became easier after the first day of games when people learned that the games were harmless and yielded cash.

Because of a weeklong school holiday, we were able to conduct the DG/UG experiments in the four-room school located atop a hill on the outskirts of the village. Typically, villagers go up to the school area to bring their children lunch when school is in session, and then again at the end of the day when the young men play rugby on the school's field. Villagers do not generally enter school grounds unless they are going there for a particular purpose.

As the participants arrived they congregated outside the first classroom, and our four Fijian field assistants moved through the crowd completing demographic information sheets. When we were ready to begin, we all moved into the first classroom, and a bag with sticky name tags (with numbers on them) was passed around the room. Each person selected a number from the bag and affixed the sticker to his or her chest. These numbers determined the order in which people would play. Following the instructions (explained in standard Fijian by a Fijian field assistant) and payment of show-up fees, players were called one at a time into one of two other rooms to play the game. In the first game room, the games were conducted by Joe Henrich (JH) and a female Fijian assistant. A parallel process occurred next door with Natalie Henrich (NH) and a male Fijian field assistant. The dual-room design allowed us to stay within the time constraints and to compare the effects of different researchers on the findings.

Players awaiting their turn remained in the first room, where a film was shown on our laptop computer (powered by a solar-powered battery). A field

assistant monitored the classroom to ensure that no conversations about the game took place. Conversations were not a problem, as everyone was mesmerized by the film. As players completed their game decision they moved into a fourth room where tea and biscuits were served.[3]

Once everyone completed the DG, all the players were brought back into the starting room, where the UG was explained. The procedure of moving from waiting in room 1 to playing in room 2 or 3, and then proceeding to the postgame waiting area in room 4, was repeated for the UG. At the end of the second game, players were again brought into room 1, and envelopes with payoffs from both games were distributed to each player; then everyone was thanked and dismissed. Over the course of the four sessions, thirty-five pairs played the DG and UG.

Recruitment for the TPG was the same as for the DG/UG experiments. People who had played the DG/UG were not initially included in the list of eligible players for the TPG, although as we ran out of fresh players we began back-filling with randomly selected repeat players, assigning most of them to the inert role of player 2. (This imperfection is discussed further later.) Since the school was not available when we conducted the TPG, these sessions were played in the village in three adjacent houses. As with the DG/UG, all the players gathered in one house, where assistants helped them complete demographic information sheets, numbers were picked from a bag, show-up fees were paid, and the game was explained in Fijian by a field assistant. After these preliminaries, a film was shown and the dual-experimenter approach was again employed. After players had their turn, they were told that they could leave, but that they were not permitted to return to the house where players were still awaiting their turn. Players were told to return in the afternoon to receive their payoff. The field assistant monitoring the house made sure that no players reentered the house after their turn. A total of thirty trios played the TPG.

RESULTS

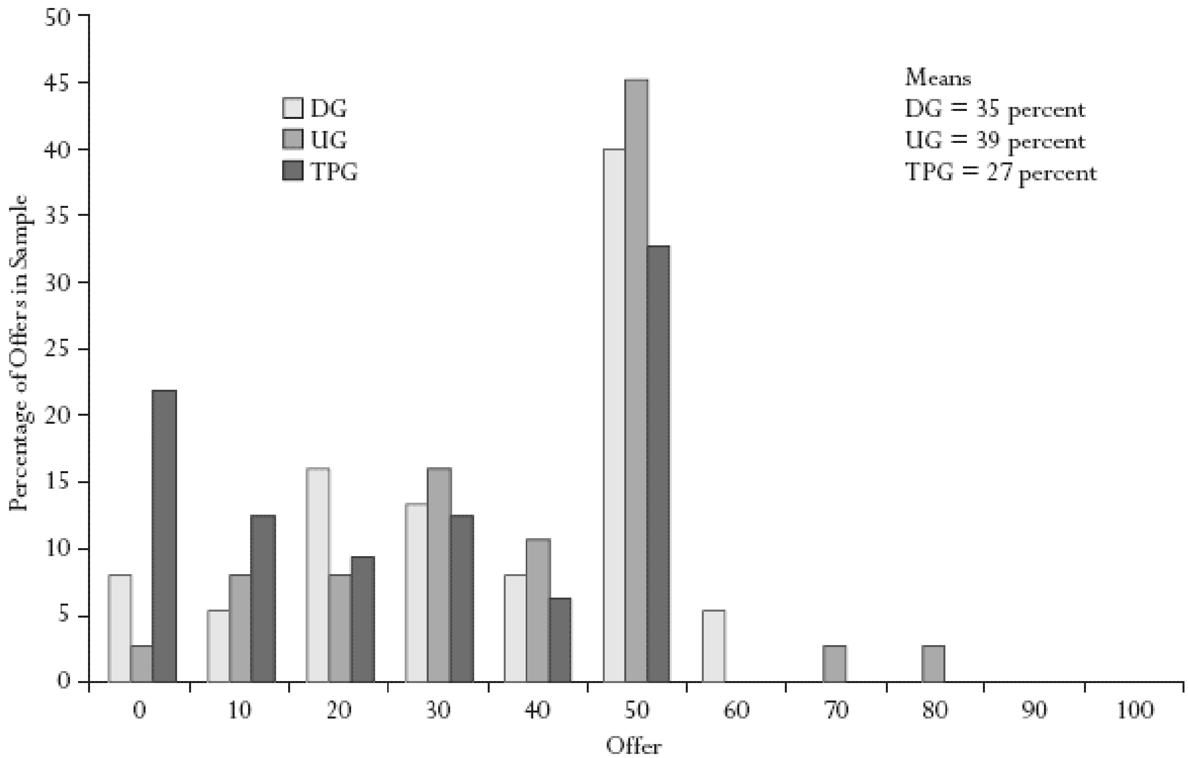
In summarizing the basic findings for all three experiments in Yasawa, we focus on five behavioral measures: offers in the DG, the UG, and the TPG and punishment in the UG and the TPG. First, we compare the Yasawan results from each of the games. Second, we compare our Yasawan findings to a set of experiments using the same protocols and the same primary

experimenters conducted with students at Emory University. Third, we attempt to explain the variation across our Yasawan participants using a set of social, economic, and demographic variables to test both the market integration hypotheses and the effects of age, sex, income, wealth, household size, status, network centrality, and kinship. Finally, we analyze the data for the possible effects of "degree of understanding" or any collusion, contagion, or contamination that might have been produced by the time gap between the sessions of the experiment.

Yasawan Offers: Equitable Despite a Lack of Punishment

Figure 9.1 summarizes the offers made by Yasawans in each of the three games. The modal offer in all three games was one-half of the initial stake, with 46 percent of player 1s offering this in the UG, 40 percent in the DG, and 33 percent in the TPG. Mean offers follow the same pattern, with averages of 39 percent in the UG, 35 percent in the DG, and 27 percent in the TPG. Table 9.1 shows the results of three pairwise nonparametric comparisons. Testing the hypothesis that the samples are drawn from the same distribution, only the Epps-Singleton test comparing the UG and TPG suggests a significant difference.[4]

FIGURE 9.1 *Yasawan Offer Distribution for the Dictator Game, the Ultimatum Game, and the Third-Party Punishment Game*



Source: Authors' figure based on the data collected.

Using offers in the DG as a baseline when no punishment is possible, we can examine the effect of both second- (UG) and third-party punishment (TPG). For the UG, the threat of direct punishment may have increased the average offers by about 4 percent, although the increase was not large enough to detect at conventional significance levels. Under the threat of third-party punishment, the mean offer actually drops from 35 percent in the DG to 27 percent in the TPG, a recurrent pattern across sites in this project (see chapter 4).

TABLE 9.1 *Comparison of Yasawan Offer Distributions*

p-Values (Two-Sided)	Dictator Game–Ultimatum Game	Dictator Game–Third-Party Punishment Game	Ultimatum Game–Third-Party Punishment Game
Epps-Singleton	0.78	0.31	0.097
Wilcoxon	0.19	0.32	0.16

Source: Authors' calculations based on the data.

Figure 9.2 compares the offers made by Yasawans and Emory students in the same experiments.[5] For the DG, figure 9.2 shows that our sample of Yasawans offer 3 percent more on average than Emory students, although this difference is not statistically significant (p = 0.38, E-S). For the UG, figure 9.2 shows that our sample of Emory students offers 2 percent more than the Yasawans, although this difference is also not significant (p = 0.62, E-S). Comparing the DG and UG shows that offers increase an average of 9 percent from the DG to the UG (presumably because of the threat of punishment) at Emory, but only by 4 percent in Yasawa. Finally, in our TPG, the distribution of Yasawan offers is quite similar to that observed among Emory students, each showing modes at 0 percent and 50 percent.

It is striking that the Yasawan villagers and the Emory students make very similar offers and that there may be effects of adding a threat of punishment in both groups. Both groups offer the most in the UG (with its threat of direct punishment), the next most in the DG (with no threat of punishment), and the least in the TPG (with the threat of third-party punishment).

Second- and Third-Party Punishment

The difference between the Yasawan and Emory samples in their willingness to punish in the UG is shown in figure 9.3. The bars show the proportion of player 2s in the UG who were willing to reject at each of the possible offer amounts. Although both distributions show that the likelihood of rejection declined as offers increased from 0 percent to 50 percent, Yasawans were substantially less willing to reject low offers than were Emory students. For example, our sample of Emory students rejected 100 percent offers of 0 percent, while only 29 percent of Yasawans did so (that is, over 70 percent were willing to accept an offer of zero). At the smallest non-zero offer (10

percent), over 40 percent of Emory students would reject, compared to only 15 percent of Yasawans.

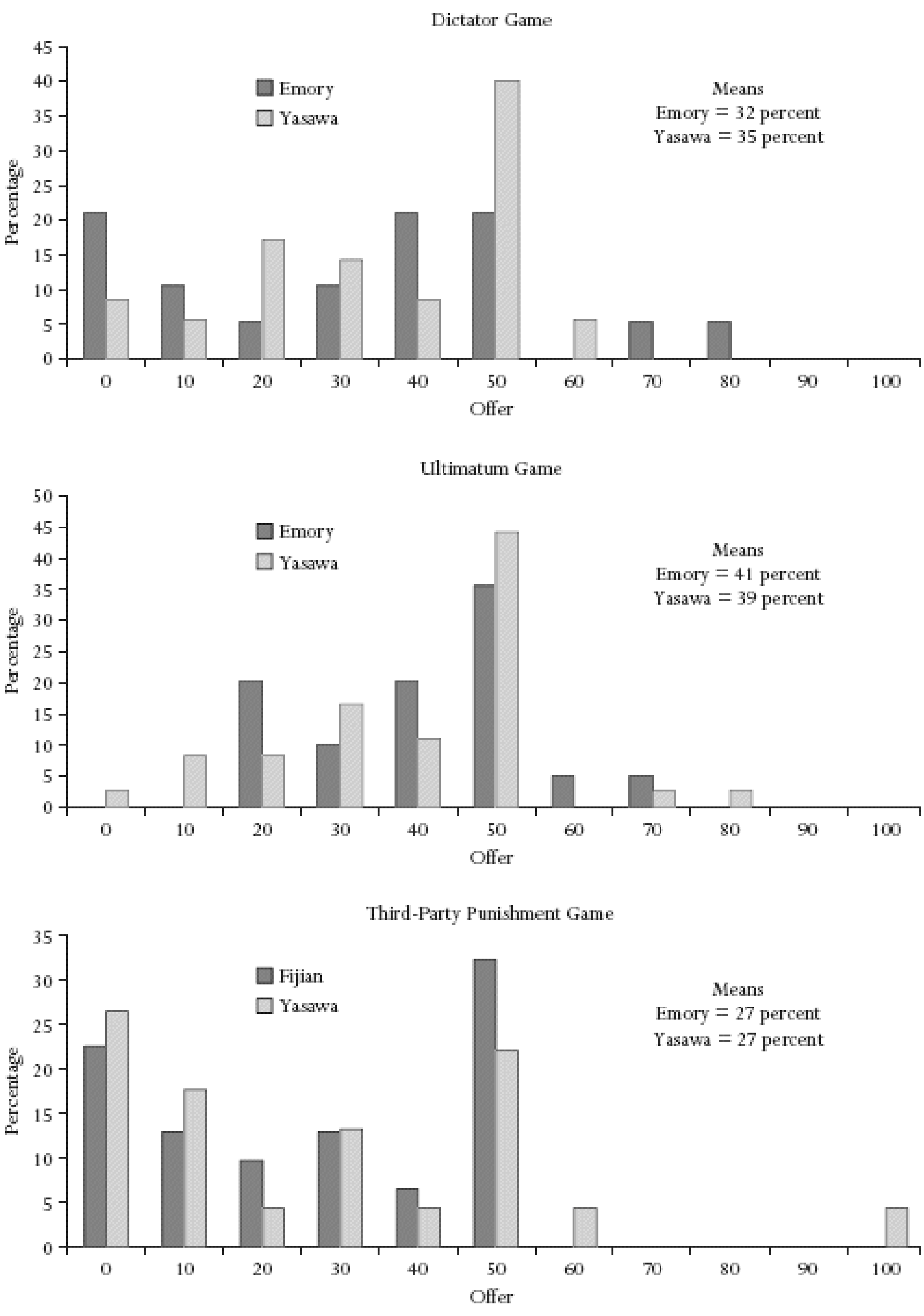
If individuals are purely self-interested, they should be indifferent as to whether they accept or reject an offer of zero. This means that 50 percent of participants would accept an offer of 0 percent and 50 percent would reject it. We tested this null hypothesis and found that Yasawans were statistically *less* likely to punish than predicted by this purely selfish null hypothesis (p = 0.012, binomial probability test). In contrast, Emory students were statistically *more* likely to punish than this purely self-interested hypothesis would predict ($p < 0.001$). As we discuss later, the Yasawans' responses to offers of zero are particularly difficult to account for using the kinds of theoretical approaches that have been successful in explaining games with students (for example, inequity aversion).

On the other side of the fifty-fifty offer, some Yasawans in Teci and Dalomo were willing to reject “hyper-fair” offers, while not a single Emory student was willing to reject any offer above 40 percent. This willingness to reject hyper-fair offers gave a lopsided U-shape to the distribution of Yasawan rejections and made a fifty-fifty offer the only offer in Yasawa that would always be accepted. While offers above 50 percent were not rejected very often, the frequency of rejections for high offers is comparable to those for low offers. Thus, an offer of 100 percent was rejected 20 percent of the time, while an offer of zero was rejected 29 percent of the time. An offer of 90 percent was rejected 12 percent of the time, while an offer of 10 percent was rejected 15 percent of the time.

Using the rejection distributions, we calculated the expected income for offer amounts in our two populations and plotted it as a line in figure 9.3. Using this expected income curve, we can ask what offer a player 1 would make if he or she wanted to maximize his or her income from the game. Following our previous work, we call the offer that would maximize player 1s' income the income-maximizing offer (IMO). As is the case for most populations discussed in this volume, the IMO for the Yasawan population occurred at an offer of 10 percent (giving an income of 77 percent of the total stake); this is also the prediction for player 2s from the canonical model of pure self-interest. The next-best offer for income-maximizing was 0 percent, which would yield an income of 71 percent of the stake. In contrast, the Emory IMO was an offer of 30 percent (yielding an income of 59 percent), and the second-best offer for income-maximizing was 40 percent,

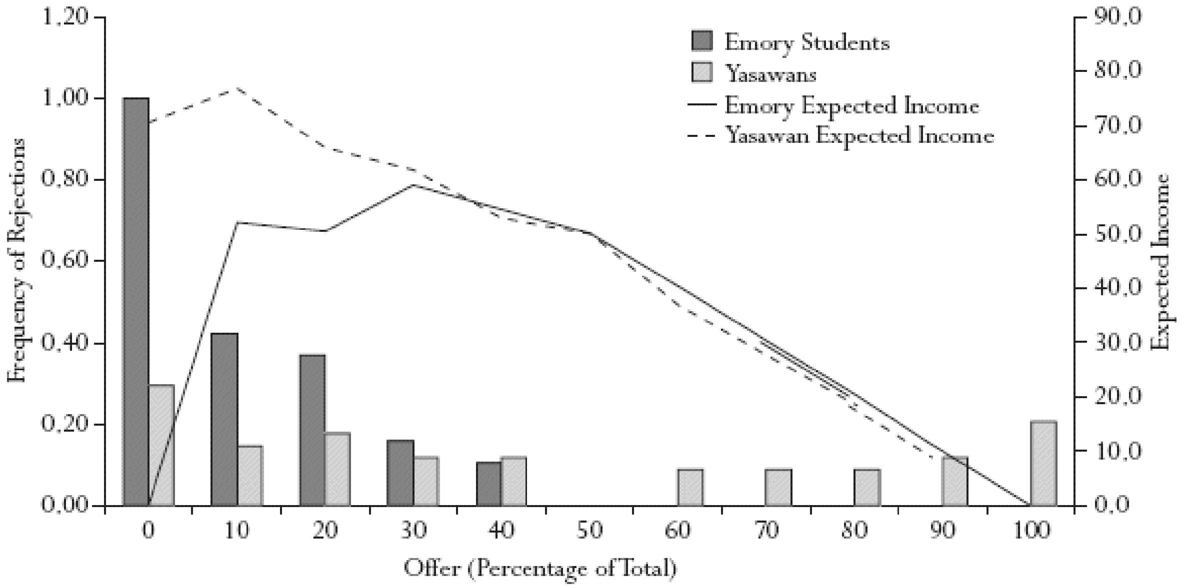
yielding an expected income of 54 percent of the stake. While the Yasawan curve of expected income shows a sharp and steady drop after the IMO at 10 percent, the Emory student curve is nearly flat between 10 percent and 50 percent, with a sharp decline beyond the fifty-fifty offer.

FIGURE 9.2 *Comparison of Yasawan and Emory Student Offer Distributions*



Source: Authors' compilation based on the data.

FIGURE 9.3 *Comparison of the Distributions of Player 2 Rejections in the Ultimatum Game Across All Possible Offers for Yasawans and Emory Students*

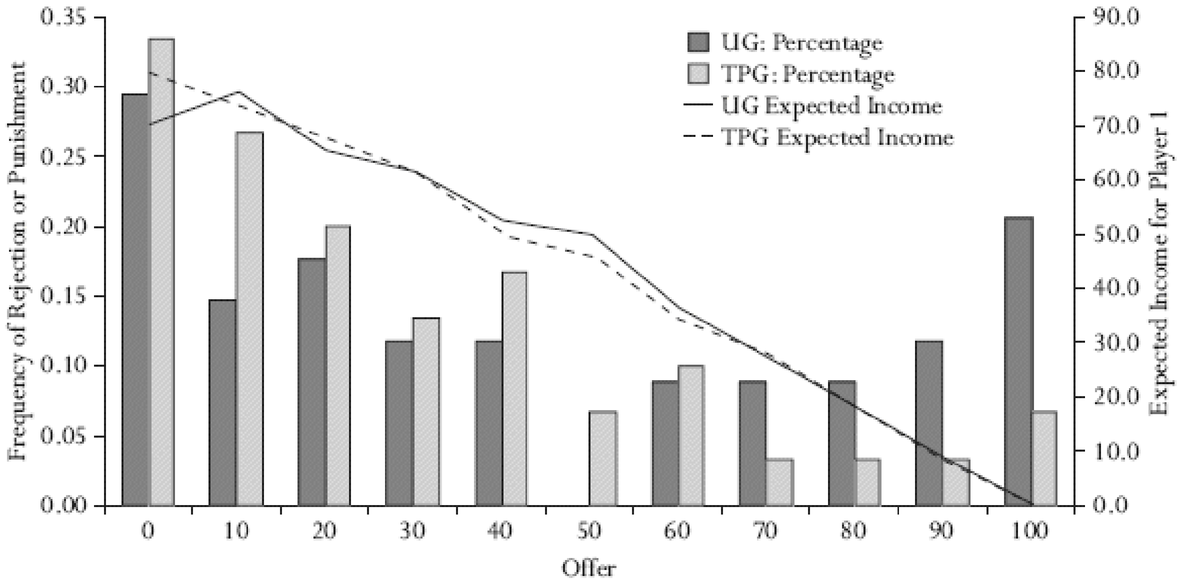


Source: Authors' compilation based on the data.

Comparing Second- and Third-Party Punishment

Figure 9.4 compares the willingness of Yasawan player 1s to reject offers in the UG to their willingness to punish third parties in the TPG. The patterns are similar for these two measures. An offer of zero evoked punishment from 29 percent of the player 2s in the UG and 33 percent of player 3s in the TPG. Offers of 10 percent provoked rejections from 15 percent of player 2s and 27 percent of player 3s. For offers above 50 percent, player 3s also showed some willingness to punish. In comparing these propensities for rejection, it is important to remember that the costs of punishing, for both player 3 and player 1, are quite different in these two games, so direct comparisons of the distributions of punishment are potentially misleading.[6] Using the punishment data from both games, we calculated the expected income to a player 1 making that offer (the IMO). In the TPG, the IMO occurs at zero, after which the expected income drops steadily across all offers. After an offer of 10 percent, the expected income curves for the UG and TPG drop in lockstep with the expected income for the same offer in the UG.

FIGURE 9.4 *Comparison of Yasawan Rejections Made Across Possible Offers by Player 2s in the Ultimatum Game and Player 3s in the Third-Party Punishment Game*



Source: Authors' compilation based on the data.

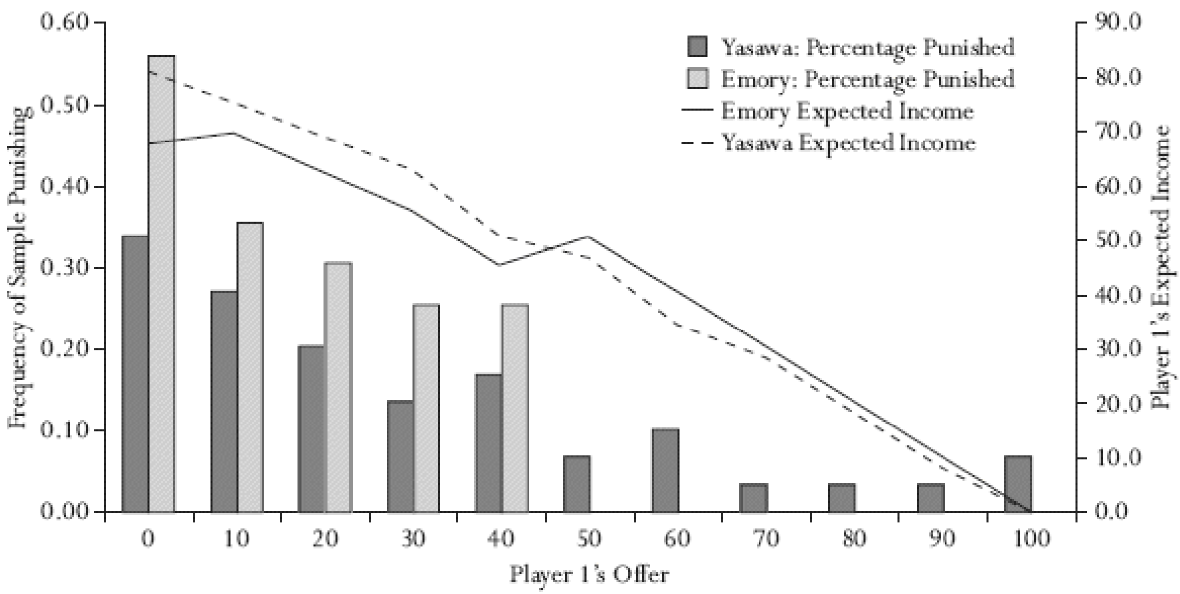
Comparing Third-Party Punishment Among Yasawans and Emory Students

Figure 9.5 compares the behavior of player 3 in the TPG in Yasawa and at Emory. As we saw in the UG, the general patterns of punishment across offers less than 50 percent are similar, except that Yasawans were less likely to punish than the Emory students. While 55 percent of Emory students would pay to punish an offer of zero, only about 30 percent of Yasawans were willing to do so. The taste for punishment at Emory was strong enough to push the IMO from 0 to 10 percent. Similarly, for an offer of one-fifth of the stake, 30 percent of Emory students would pay to punish, while only one-fifth of Yasawans would do so. For offers of 50 percent and up, punishment ceased among Emory students, while a few Yasawans were willing to punish such offers. Between 3 and 7 percent of Yasawans continued punishing above 50 percent.

Studying Within-Group Variation in Yasawan Game Behavior

For each of our five behavioral measures across our three games, we systematically—and in coordination with the other contributors to this volume—studied the predictive power of a set of six economic and demographic variables, as well as the relationship between DG and UG offers. In addition, we examined the effects of social status, network centrality, and kinship on game play. We also looked for evidence of confusion (or misunderstanding); collusion, contamination, or contagion between sessions; and experimenter effects.

FIGURE 9.5 *Comparison of Third-Party Punishment Game Offers Among Yasawans and Emory Students*



Source: Authors' compilation based on the data.

To match the analysis of economic and demographic variables across sites we examined the following as predictor variables: age (in years), sex, education (years of formal schooling completed), individual annual income, household wealth, and household size.[7] Figure 9.6 shows the histograms for these variables from the overall population in order to give a sense of the distributions of our predictor variables. (We sampled our subjects from these distributions.) For each of the behavioral measures, we estimated a series of multiple linear regression equations with these as predictors. Unless otherwise stated, all the regressions are ordinary least squares (OLS) using these variables. For comparability of regression coefficients, and for the

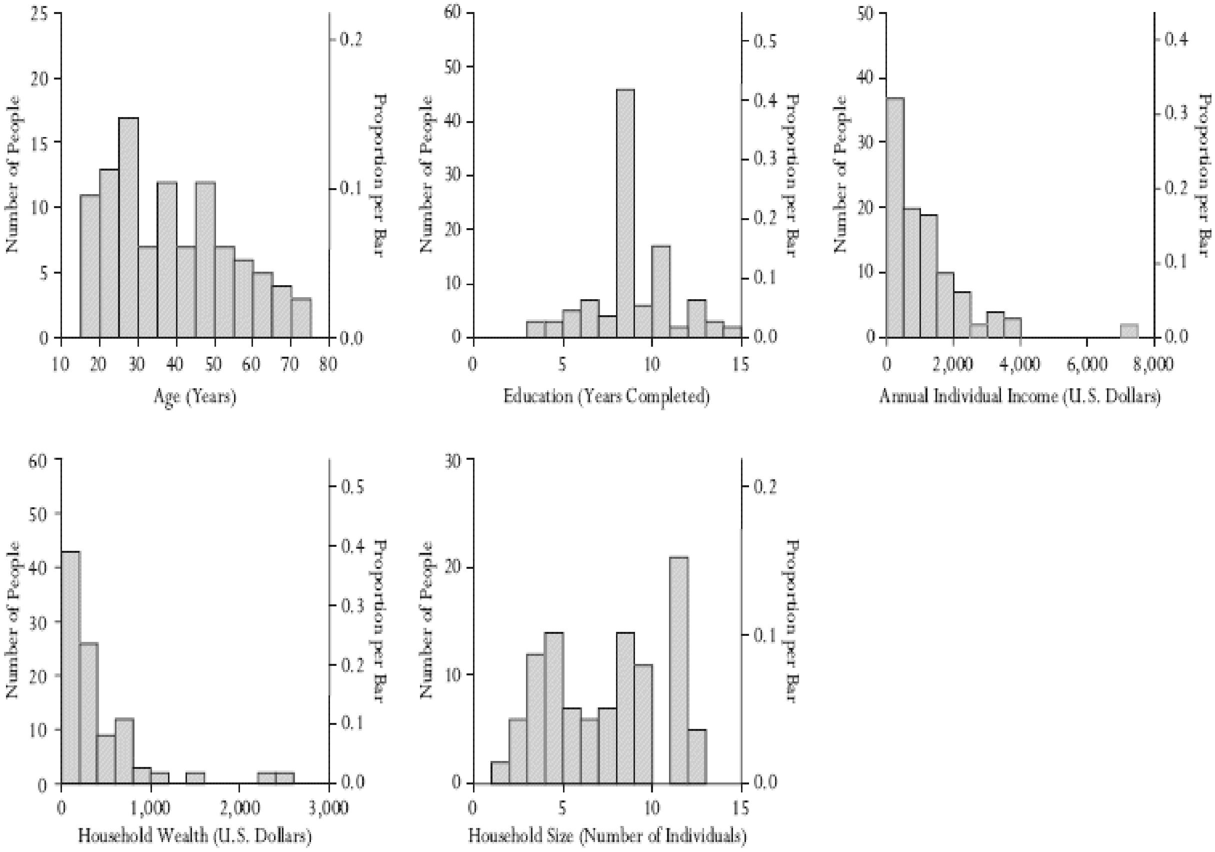
stability of the regressions, we scaled several of the predictors by their standard deviations. For potentially significant results, we did two robustness checks. First, because the standard errors of our regression coefficients are likely in question, we ran a bootstrapping procedure to estimate the distribution and confidence intervals (and standard errors) on those coefficients.[8] We also ran a robust regression that minimizes the *absolute* distance between the regression line and the data point (rather than the square of the distance, as these can give unwanted weight to outliers). The upshot of all this analysis? Economic and demographic variables do not predict variation in game behavior in any consistent way.

The Dictator Game

Table 9.2 shows our project-standardized set of regression results using DG offer as the dependent variable. This analysis indicates that these economic and demographic variables do not predict DG offers. The adjusted R-squared never exceeds 0.001 for any of these models.

A further exploration of possible interactions between the variables shows an interesting sex difference. For females alone, none of the standard six independent variables matter. However, for males (N = 16), both age and education are significant and robust. From the bootstrapping analysis, the coefficients are −16.9 for age and −7.04 for education, with standard errors (and bootstrapped 95 percent confidence intervals) of 5.34 (−26.6 to −5.2) and 4.23 (−13.8 to 2.53), respectively.[9] Alone, these two variables and a constant explain about 40 percent of the variation (adjusted R-squared) in male offers. In short, older, more-educated males offer less in the DG, with age showing more than twice the effect of education.

FIGURE 9.6 *Age, Education, Individual Income, and Household Wealth of Yasawans, per Household Member*



Source: Authors' compilation based on the data.

TABLE 9.2 *Linear Regressions of Yasawan Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−8.12					
	(5.08)					
Female	−6.94	−4.00				
	(8.00)	(8.00)				
Education	−0.41	1.05	0.69			
	(2.02)	(1.85)	(1.68)			
Individual income	0.77	2.473	3.74	3.96		
	(4.83)	(2.47)	(4.06)	(3.97)		
Household wealth	−2.48	−3.08	−2.96	−2.69	−2.00	
	(3.58)	(−3.075)	(3.60)	(3.49)	(3.42)	
Household size	1.62	2.59	3.28	3.41	2.61	2.02
	(3.60)	(2.59)	(3.33)	(3.27)	(3.17)	(2.96)
Constant	60.3**	22.1	20.2	25.3**	30.1***	30.5***
	(28.9)	(16.8)	(16.1)	(10.2)	(8.98)	(7.49)
Observations	34	34	34	34	34	35
Model significance	0.53	0.77	0.68	0.53	0.54	0.50
Adjusted R-squared	0.00	0.00	0.00	0.00	0.00	0.00

Source: Authors' calculations based on the data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except for female.

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

The Strategy Method Ultimatum Game

Table 9.3 shows the same analysis for UG offers using our six predictors. The best regression explains about one-quarter of the variation (adjusted R-squared) and involves sex and household size. Females offer about 17 percent less than males and people from larger households offer less. (A standard-deviation change in household size reduces an offer by about 5 percent.) These effects do not vary much in our bootstrapping analyses or our robust regressions. When the sample is partitioned by sex, we find that household size has twice the effect on offers by women compared to men.

We also explored the relationship between DG and UG offers. Figure 9.7 shows similar, substantial correlations between DG and UG offers for Yasawans and Emory students. This feature of our design allows us to explore the relationship between offers in the two games. Specifically, do individuals who make high offers in the DG make similar offers in the UG? Our design, with the two games played consecutively, should allow us to set an upper bound on this relationship.[10] Both samples show a strong positive

relationship between DG and UG offers, with correlations of $r = 0.51$ and $r = 0.42$ for Yasawa and Emory, respectively ($p = 0.085$ for both). This tells us that there was considerable consistency across games, and that the degree of consistency was about the same at the two sites.

TABLE 9.3 *Linear Regressions of Yasawan Ultimatum Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	−0.373					4.04	7.87***
	(4.61)					(3.93)	(2.14)
Female	−19.7**	−19.6***	−18.67***	−17.4***	−17.14***	−15.7**	−13.1**
	(7.27)	(6.95)	(6.36)	(5.56)	(5.39)	(6.02)	(5.65)
Education	1.14	1.30				1.91	4.46*
	(4.18)	(3.66)				(3.41)	(2.62)
Individual income	−2.21	−2.13	−1.69			−2.67	−1.41
	(4.37)	(4.18)	(3.92)			(3.56)	(3.41)
Household wealth	1.205	1.18	1.42	1.18		2.29	2.25
	(3.28)	(3.20)	(3.08)	(3.00)		(2.69)	(2.71)
Household size	−5.431	−5.39	−5.13	−4.67	−5.33**	−6.32**	−5.19**
	(3.26)	(3.15)	(3.02)	(2.79)	(2.58)	(2.66)	(2.50)
Dictator Game offer						9.69***	10.8***
						(2.57)	(2.40)
Constant	60.13**	58.4***	61.5***	58.4***	61.1	26.8	
	(26.2)	(14.6)	(11.48)	(8.87)	(7.60)	(23.1)	
Observations	33	33	33	33	34	33	33
Model significance	0.14	0.08*	0.04**	0.019**	0.006	0.003***	0.00***
Adjusted R-squared	0.13	0.16	0.19	0.21	0.24	0.43	0.91

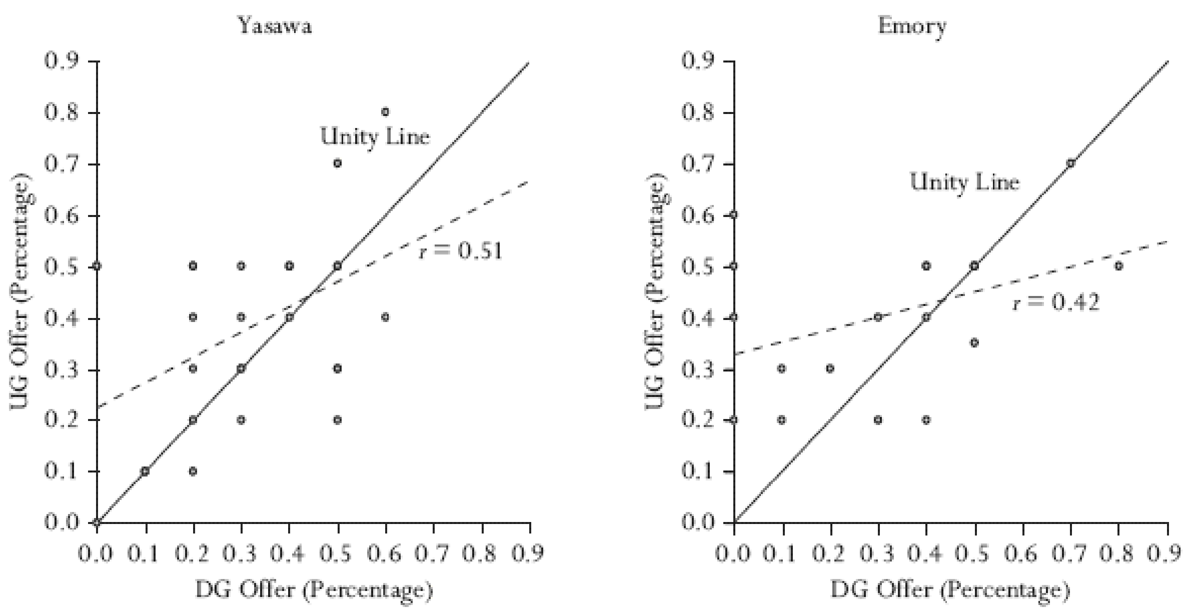
Source: Authors' calculations based on the data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except for female.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

If we take the DG offer as a measure of an individual's behavioral fairness in this game situation, we might be able to use the DG offer in combination with our other economic and demographic variables to predict how a person will react in the UG. Table 9.3 shows that if the DG offer is combined with our demographic and economic variables, 43 percent of UG offers are explained (model 6). If we remove the constant, the variance explained increases to 91 percent (model 7). With DG offers controlled for, we see that females offered less than males, older people offered more than

younger people, more-educated people offered more than less-educated people, and people from larger households offered less than people from smaller households.

Looking at the responder side of the UG, thirty-one of our thirty-four UG player 2s had a distribution of accept/reject decisions across offers that permitted us to represent their behavior with a single number, their minimum acceptable offer (MinAO).[11] An individual's MinAO represents the threshold *below* which he or she begins rejecting. Taking this as a dependent variable, we examined the effect of our six predictors. Table 9.4 shows that age and education emerge as significant predictors of about equal magnitude (note that age and education themselves are correlated, $r = -0.38$), with the best model explaining about 32 percent of the variation. Bootstrapping yields comparable standard errors of 2.5 for age and 2.9 for education.

FIGURE 9.7 *Dictator Game and Ultimatum Game Offers Showing Correlations Among Yasawans and Emory Students*



Source: Authors' compilation based on the data.

TABLE 9.4 *Linear Regressions of Yasawan Ultimatum Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	−6.06***	−5.98***	−5.53**	−5.57**	−5.85***
	(2.12)	(2.08)	(2.09)	(2.05)	(2.11)
Female	2.079				
	(5.06)				
Education	−5.690**	−5.68**	−5.07**	−5.23**	−5.62***
	(2.08)	(2.04)	(2.03)	(1.92)	(1.96)
Individual income	4.46	3.87			
	(3.19)	(2.79)			
Household wealth	−0.073	0.026	−0.65		
	(2.34)	(2.29)	(2.27)		
Household size	4.270*	4.22*	3.64	3.60	
	(2.25)	(2.21)	(2.20)	(2.16)	
Constant	26.7**	28.5	31.0**	31.2	40.7
	(12.1)	(11.12)	(11.2)	(10.9)	(9.62)
Observations	31	31	31	31	31
Model significance	0.022**	0.011	0.01	0.004	0.004
Adjusted R-squared	0.29	0.32	0.29	0.32	0.27

Source: Authors' calculations based on the data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except for female.

***Coefficient significant at < 0.01 level in two-tailed test

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

TABLE 9.5 *Linear Regressions of Yasawan Third-Party Punishment Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	6.94*	7.11*	6.80*	7.17*	6.9*	6.91*	0.89	1.24*
	(3.91)	(3.80)	(3.46)	(13.2)	(3.53)	(3.45)	(0.79)	(0.65)
Female	−3.71						−1.24	
	(9.78)						(1.86)	
Education	0.90	1.15					−0.57	
	(5.26)	(5.11)					(1.07)	
Individual income	−4.87	−4.31	−4.25				−0.92	
	(3.11)	(2.69)	(2.61)				(0.59)	
Household wealth	−6.40	−6.27	−6.02	−5.49			−1.01	
	(4.06)	(3.96)	(3.72)	(3.95)			(0.78)	
Household size	0.53	−0.10	0.22	1.98	−0.065		0.13	
	(4.53)	(4.02)	(3.50)	(3.61)	(−7.33)		(0.85)	
Village							−2.96*	−3.06**
							(1.60)	(1.33)
Constant	15.75	13.46	17.7	8.06	9.22		8.54	3.61*
	(24.19)	(23.0)	(13.3)	(13.24)	(12.2)		5.40	(1.93)
Observations	26	26	26	27	30	30	26	30
Model significance	0.22	0.14	0.078*	0.16	0.16	0.055	0.12	0.015**
Adjusted R-squared	0.11	0.15	0.19	0.094	0.06	0.09	0.21	0.21

Source: Authors' calculations based on the data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by the standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

The Third-Party Punishment Game

As with the other games, we examined the predictive power of our six variables on offers and MinAOs in the TPG. For offers, table 9.5 shows the findings, with the best model predicting only about 19 percent of the variation. Age appears to have small effects, with older individuals offering a bit more.

For all of the experimental behavioral measures we looked for a difference between our two villages, Teci and Dalomo. “Village effects” appeared only with offers in the TPG. Moving from Teci to Dalomo decreased a player 1's offer in the TPG by around 3 percentage points, controlling for economic and demographic factors. Model 8 shows that the effect of age is weakened, but still present, when village is included.

For our last behavioral variable, we regressed MinAO for the TPG on our six demographic and economic variables (table 9.6). Using all six variables, nothing is significant at conventional levels, although age and income have large coefficients (but also large standard errors).[12]

TABLE 9.6 *Linear Regressions of Yasawan Third-Party Punishment Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	11.3					
	(6.91)					
Female	−4.12	−9.38				
	(9.93)	(10.2)				
Education	0.42	−4.42	−4.75			
	(5.73)	(4.14)	(4.11)			
Individual income	−12.6	−16.0	−14.4	−14.2		
	(8.93)	8.67	(8.47)	(8.53)		
Household wealth	0.092	0.21	1.20	0.83	0.046	
	(5.10)	(5.36)	(5.22)	(5.26)	(5.44)	
Household size	−2.93	−1.62	−0.83	−2.20	−1.89	−1.43
	(5.26)	(5.48)	(5.39)	(5.30)	(5.51)	(5.21)
Constant	0.50	48.4**	41.0**	26.8	15.6	14.1
	(41.5)	(21.0)	(19.4)	(15.1)	(14.0)	(12.9)
Observations	24	25	25	25	25	26
Model significance	0.20	0.43	0.40	0.43	0.94	0.79
Adjusted R-squared	0.14	0.004	0.01	0.00	0.00	0.00

Source: Authors' calculations based on the data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation), except female.
**Coefficient significant at < 0.05 level in two-tailed test

Social Network Measures of Prestige and Centrality

To evaluate the potential relationship between measures of status (based on network measures) and game play we used the project's standardized network question to gather data from the entire yavusa. We asked every person over the age of ten who they "usually talk to about any kind of problem" (Barr, Ensminger, and Johnson 2010). People were permitted to list as many or as few individuals as they wanted. All individuals spontaneously named between zero and five people. Using these data, for each person we summed how many times they were named by other people, weighted by the order of naming (first, second, and so on).[13] This gave us each individual's "in-degree"—a possible measure of social status. We then

regressed each of our experimental behavioral measures on this status measure in a series of analyses that followed the pattern described earlier. Our findings were negative on all counts, although we make no strong claims, as the status variable is highly non-normal, with most people having an in-degree of zero. We also analyzed “betweenness” in a similar fashion. Betweenness is meant to capture how central a person is in a network. It measures the proportion of all possible paths between all individuals that the particular individual is on (Wasserman and Faust 1994). For all of the experimental behavioral variables our findings were similarly negative, with the same caveat as earlier. A detailed study of social networks focused on cultural transmission can be found in Henrich and Broesch (2011).

Degree of Relatedness

Since many of the participants in our experiments were highly interrelated, and kinship is an explicit and important part of Fijian social life, we sought a relationship between each of our five behavioral experimental measures and two different measures of genetic relatedness. For each participant, we calculated their average degree of relatedness to other members of the yavusa (which encompasses Teci and Dalomo) and their average relatedness to other participants in their same game session. Since the experiments were anonymous, the first measure assumes that the participant listened carefully to our instructions, which stated that the other players would come from Teci and Dalomo. The second measure assumes that the participant looked around the waiting area and assessed the individuals he or she might be paired with. We calculated the coefficients of relatedness using genealogies based on cross-checked verbal reports going back three generations.

TABLE 9.7 *Genetic Relatedness on Behavioral Measures*

Behavioral Measure	Standard β Coefficient $\bar{r}$ to Yavusa (p-Value)	Standard β Coefficient $\bar{r}$ to Same Session (p-Value)
Dictator game offer	0.075 (0.67)	0.20 (0.33)
Ultimatum game offer	−0.32 (0.07)	−0.14 (0.50)
Third-party punishment game offer	−0.16 (0.42)	−0.17 (0.42)
Minimum acceptable offer–Ultimatum game	0.16 (0.4)	0.022 (0.923)
Minimum acceptable offer–Third-party punishment game	−0.33 (0.10)	−0.26 (0.28)

Source: Authors' calculations based on the data.

In considering the influence of kinship, it is important to realize that in this yavusa, despite an incredible amount of intermarriage in a population of a couple hundred, the mean average coefficient of relatedness to the entire yavusa is 0.018, and the maximum is 0.046.

Table 9.7 shows simple linear regressions of our five behavioral measures on our two measures of average genetic relatedness ($\bar{r}$). None of the beta coefficients on relatedness are significant at conventional levels, although the standardized beta coefficients on the average degree of relatedness to the yavusa are large and marginally significant. A standard-deviation increase in relatedness to the yavusa predicts about one-third of a standard-deviation drop in UG offers and MinAO in the TPG. The direction of the effect on MinAO in the TPG is consistent with the idea that people should not want to inflict costs on their relatives. The decrease in UG offers created by relatedness is more puzzling, as it is not obvious why people would offer their relatives less, unless they assume that their relatives are less likely to punish them for doing so—which is not the case if we look at MinAO-UG (although recall that there is little variation in MAO-UG). Given that we are looking at ten different regression coefficients, it is not unexpected that one *p*-value falls below 0.10 by chance.

Market Integration

To assess the effect of market integration on experimental behavior we used the five standard measures of market integration gathered at each site. Table 9.8 lists these variables (see chapter 3 for more details). Since purchased food as a percentage of total calories (MI1) varies substantially from day to

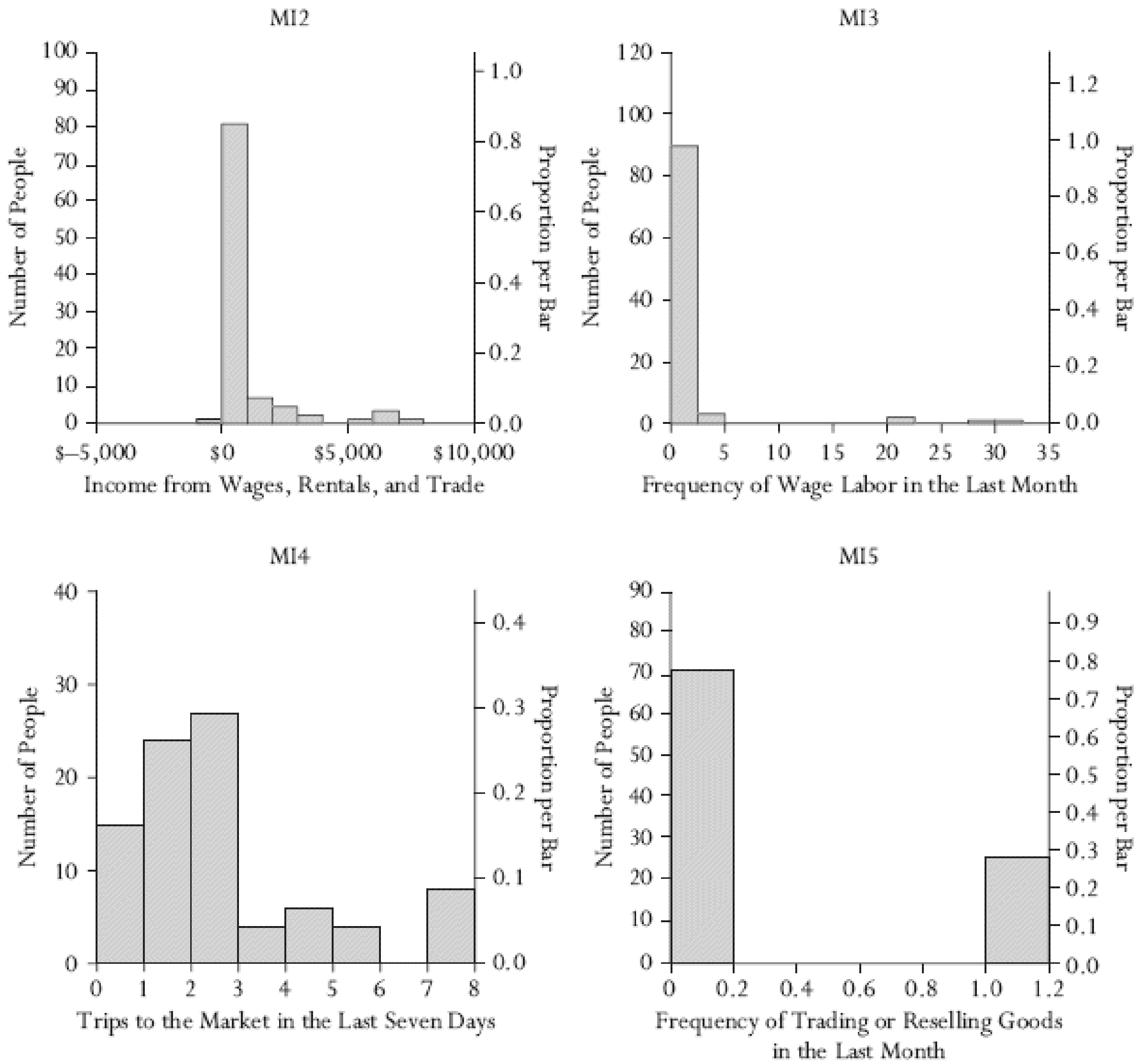
day, we did not use it to examine individual variation, although it does appear in the group-level analysis in chapter 4, where village-level averages are used. Here we summarize the findings from our analyses of income from wages, rentals, and trade (MI2), frequency of wage labor in last month (MI3), trips to the market in the last seven days (MI4), and frequency of trading or reselling goods in the last month (MI5). Only two of the five market integration variables show much variation (figure 9.8).

TABLE 9.8 *Market Integration Variables*

Variable	Description
MI1	Percentage of daily calories from purchased foods (based on one-day sample)
MI2	Income from wages, rentals, and trade
MI3	Frequency of wage labor in the last month
MI4	Trips to the market in the last seven days
MI5	Frequency of trading or reselling goods in the last month

Source: Authors' calculations based on the data.

FIGURE 9.8 *Yasawan Market Integration Variables: MI2, MI3, MI4, and MI5*



Source: Authors' compilation based on the data.

TABLE 9.9 *Correlation Coefficients for Market Integration*

	Market Integration Measures			PCA Factor Loadings	
	MI2	MI3	MI4	F1	F2
MI2	1.00	—	—	0.92	0.19
MI3	0.74 (103)	1.00	—	0.86	−0.23
MI4	0.14 (94)	0.04 (94)	1.000	0.40	−0.16
MI5	0.24 (103)	0.05 (103)	−0.041 (94)	0.093	0.98
Percentage of variance explained by factors				45 %	26 %

Source: Authors' calculations based on the data.

Before running the regressions, we examined our market integration variables for inter-correlations and ran a principle components analysis (PCA) to look for an underlying variable structure. We did this because, conceptually, the MI variables may represent a single underlying dimension or cultural evolutionary process. Alternatively, market integration may be better decomposed into independent aspects. Table 9.9 provides the Pearson correlation coefficients and the sample sizes (in parentheses) on the right side, with the PCA on the left. Both sets of analyses suggest that no underlying unidimensional factor structure exists, although factor 1 does capture 45 percent of the variation. Based on these results, we used each of our market integration variables individually.

We regressed DG offers, UG offers, TPG offers, MinAO-UG, and MinAO-TPG on each of the MI variables, and then with any of our other demographic variables that had previously been shown to be significant. Beyond this, we also put all of the MI variables into a backward stepwise regression and allowed the computer to come up with the best set of predictors. None of the MI variables have any consistent effects on any of the dependent variables, except when TPG offers are regressed on MI4. This shows that a standard-deviation increase in MI4 predicts about half of a standard deviation *decrease* in TPG offer ($\beta_{std} = -0.43$, $p = 0.023$). This regression is robust to our checks, although it is in the *opposite* direction to that predicted by the MI hypothesis in chapter 2.

Interestingly, if the village codes are included along with MI4 and a constant in the regression, the coefficient on MI4 drops to near zero (−0.40, standard error = 0.28), while the village effect does not move much from that seen in models 7 and 8 in table 9.5. Thus, the MI4 finding is actually capturing a village effect.

Session and Day Effects

Because our work continued over several days (and the DG and UG were separated by a few weeks from the TPG), there was some concern that participants who had completed the experiment might somehow have influenced the decisions of subsequent participants. To examine this, we ran ANOVAs using our five experimental behavioral variables as dependent variables and day (1 or 2) and session (1 or 2) as factors. For both the DG and UG, mean offers in the first three sessions (two sessions on day 1 and the first session on day 2) are indistinguishable. However, for both games, the mean offers in session 2 of day 2 are lower than in the other sessions.

Although this effect deserves our attention, we do not think that it represents any of the “three C's”: collusion, contagion, or contamination. If communication between subjects was influencing our results, it would have had its largest effect between days 1 and 2. However, session 1 of day 2 is not distinguishable from either session on day 1.

TABLE 9.10 *Experimenter Effects on Behavioral Measures*

Behavioral Measure	Mean JH Duo	Mean NH Duo	*p*-Value
Dictator game offer	33.3	37.4	0.51
Ultimatum game offer	38.8	40.6	0.78
Third-party punishment game offer	29.3	24.0	0.48
Minimum acceptable offer–Ultimatum game	8.89	3.8	0.33
Minimum acceptable offer–Third-party punishment game	10.0	11.2	0.91

Source: Authors' calculations based on the data.

Instead, we suspect that the effect results from a sampling bias in our early sessions. We randomly selected names for invitations to the initial sessions from our demographic survey. If individuals declined to come, however, we simply sampled again and went to the next person. By the time we were recruiting for session 2 of day 2, we were short on participants. A combination of the village buzz about cash and the persistence of our Fijian research assistants convinced many previously reluctant participants to attend the last session. All four members of our senior research team, as well as our Fijian research assistants, agreed that this last group was a “different crowd”: they seemed less socially integrated into public life and substantially less comfortable with outsiders.

This observation leaves the question of how to interpret this deviation. Interestingly, if we had been in a large village, or at a university, this segment of the local population would *never* have been sampled at all. It was only the shortage of participants, high stakes, and friendly persuasiveness of our research assistants that brought these participants into the game. Thus, we believe that they are a real part of the population that is often missed in experiments.

To explore the effect of this last session alongside our previous analyses of economic and demographic variables, we repeated the analyses with a binary variable included: one for individuals in session 2 of day 2, and zero for all others. For both the DG and UG, we found that including the variable does not influence the basic findings discussed earlier. Moreover, in the UG that last session dummy is *not* a significant predictor once sex and wealth per household member are taken into account. (But for the DG it remains significant.)

Experimenter Effects

Since we ran two experimental rooms at the same time (with participants randomly assigned to each), one with NH and a male research assistant and the other with JH and a female research assistant, we looked for any effects of the different experimenters on our five behavioral measures. Table 9.10 shows the mean values for each behavioral measure for individuals giving their decision to either the JH or NH duo. The *p*-values come from an ANOVA analysis. No significant differences are observed between our experimental teams.

Effects of Level of Understanding

For each person, we used at least four examples to teach the game and to test their comprehension. Table 9.11 shows a summary of the number of examples used in each game by players who eventually passed the test. These values provide a measure of the relative difficulty that this population had in comprehending the experiments. Clearly, the TPG was the most difficult for people to understand.

TABLE 9.11 *Number of Examples Used to Explain the Games*

Number of Examples	Dictator Game	Ultimatum Game	Third-Party Punishment Game
Minimum	4	4	4
Maximum	9	15	20
Mean	4.5	5.8	8.8

Source: Authors' calculations based on the data.

Although all of our subjects had to pass a preplay test that involved answering two hypothetical game problems correctly, it is possible that some individuals learned to pass the tests by seeing repeated examples without fully comprehending the game. This could have influenced our results in two ways. First, confused people could have biased their choices in one direction. Confused individuals might have tended to prefer the choices in which they seemed to get more money (which they might have noticed in the examples), even if they did not understand the underlying logic. Because learning to "beat the test" requires many examples, we can test for this possibility by regressing each of our five behavioral variables on the number of examples each player required to pass the test. If this hypothesis is true, the coefficient should be negative and significant. This is not the case: all of our regressions produce small, nonsignificant coefficients for our number-of-examples variable.

A second way in which confusion might influence our results is by increasing our variance. Partially confused individuals might be more likely to behave randomly or at least in a way inconsistent with those who understand the game. To explore this, we regressed the *absolute differences* between an individual's offer (in each game) and the mean offer for that game on number of examples. No significant effects were found. The offers of people who required more training examples did not deviate from the group mean any more than they did for people who required fewer training examples. We also did the same thing using the deviation from the mode, with the same negative results.

Overall, these results, along with our generally negative findings for the effect of education on game behavior, indicate that comprehension of the game was not responsible for variation in our results. This parallels the results from using all the data from the project together (Henrich et al. 2006).

POSTGAME INTERVIEWS

Following the completion of all the games, we conducted postgame interviews with a subsample of players (N = 19 for the UG and DG, N = 20 for the TPG).

In our postgame interviews, we asked, “How much *should* player 1 have allocated to player 2 [in each of the three games]?” In standard Fijian, the term for “should,” “dodonu me,” captures just the right connotation for our purposes, implying “proper” or “appropriate” behavior for the circumstances.[14] There was near-unanimity in response to this question, with all but two people saying that player 1 *should* give 50 percent to player 2 (table 9.12). Even people who did not themselves give 50 percent said this.

Players were also fairly consistent in how they said they would feel if player 1 offered them zero in the UG, and how they thought players 2 and 3 would feel if player 2 received an offer of zero in the TPG. There was solid agreement that the dominant emotions of players 2 and 3 would be sadness and anger. During the postgame debriefing, interviewers let the respondents list as many emotions as they wanted. If the respondent did not spontaneously add “sad” (rarawa, or yalobibi, literally “heavy spirit”) or “angry” (cudru) to their listing, the interviewer would probe further by asking specifically about these emotions, and would often also ask about “happy” (marau). Tables 9.13 and 9.14 show the frequency of mentions of the different emotions, with the number in parentheses indicating the number of additional people who agreed that they would feel sad or angry when this was eventually suggested by the interviewer. When asked about the feelings of players 2 and 3 in the TPG, “sad” and “angry” were the dominant emotions, and people less frequently reported several other emotions. These other emotions, when they were elicited, were always negative, indicating that very low offers elicit the kind of negative affect associated with norm violations. Also of note is that most people did not think that player 3, unlike player 2, would feel sadness (although “concern” was suggested by some), but the same number felt that players 2 and 3 would feel anger. Interestingly, this negative emotion does not translate into punishment—lots of people mentioned anger, but few thought that this would lead to a desire to punish. (This idea was probed directly.) Moreover, several players said that they thought that no negative emotion would be experienced, and 26 percent of respondents said that in the UG player 2 either would need to accept the fact

that he or she got a low offer or would be okay with it. This is consistent with the relatively low rate of punishment compared to Emory students.

TABLE 9.12 *Number of Responses to the Question: "How Much Should Player 1 Send to Player 2?"*

Percentage	Dictator Game	Ultimatum Game	Third-Party Punishment Game
10	0	1	1
25	1	0	0
50	17	17	19

Source: Authors' calculations based on the data.

TABLE 9.13 *Number of Responses to the Question: "In the Third-Party Punishment Game, If Player 1 Sent $0 to Player 2 and Kept $20, How Would Players 2 and 3 Feel?"*

Emotions	Player 2	Player 3
Sad	15	4
Angry	15 (4)	11 (2)
Okay/must accept it	2	0
That Player 1 is greedy	2	0
Concerned about/sorry for Player 2	—	8
Want to punish Player 1	0	2

Source: Authors' calculations based on the data.
Note: N = 20.

TABLE 9.14 *Number of Responses to the Question: "In the Ultimatum Game, How Would You Feel If You Received an Offer of $0 from Player 1?"*

Sad	13 (4)
Angry	10 (8)
Okay/accept it	5
Dissatisfied	1
That Player 2 is greedy	1

Source: Authors' calculations based on the data.
Notes: N = 19. The number of responses adds to more than the number of respondents because people could list more than one feeling. The number in parentheses indicates the number of additional people who agreed that they would have this emotion when explicitly asked about it. The interviewers did not restrict their suggestions to "angry" and "sad," but also asked about "happy." Not a single person

agreed with the suggestion that he or she would be "happy" about such an offer, showing that respondents were not just agreeing or going along with the interviewer.

TABLE 9.15 *Number of Responses to the Question: "What Does This Game Remind You Of?"*

Response	Dictator Game (N = 20)	Ultimatum Game (N = 20)	Third-Party Punishment Game (N = 25)
Could not think of anything	11	15	16
Sharing with relatives	4	4	4
Sharing (with relatives or others)	6	4	4
Fighting over something	0	1	1
Giving money to church	1	0	0

Source: Authors' calculations based on the data.

In the postgame interviews, players were also asked what each of the games reminded them of. Table 9.15 shows that the most common reply was that the game did not remind them of anything. The second most common reply was a rather vague association with sharing, either with relatives or nonrelatives. Combined with the findings about negative emotions, this suggests that the game may have tapped a rather *generalized* norm or preference related to fairness, sharing, and equity in social interactions with fellow villagers.

We have now done such postgame interviews with university students, Machiguenga, Mapuche (Henrich 2000; Henrich and Smith 2004), Chaldeans in Detroit (Henrich and Henrich 2007), and Yasawans. The results indicate that sometimes people link the game to specific contexts or a set of contexts (as did many Chaldeans), but that most of the time no explicit link can be stated.

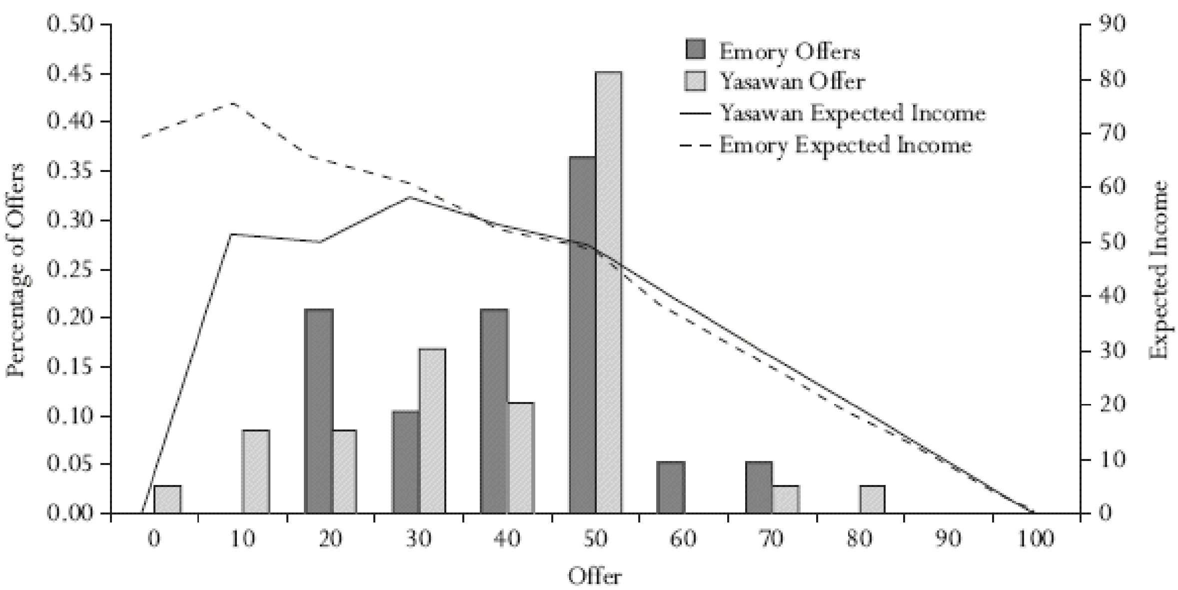
DISCUSSION

Several major findings emerged from these experiments. At the group level, offers in our Yasawan sample were generally consistent with the findings from our "standard" student-subjects. Yasawan villagers showed substantial contributions in all three games, with modal offers at equity (50 percent). The highest mean offer occurred in the UG, then the DG, and finally the TPG. Emory students showed a similar pattern across games, although their increase in mean offers in moving from the DG to the UG was about double

that observed in Yasawa. On the punishment side, Yasawan player 2s and player 3s revealed very little willingness to punish low offers, in both absolute terms and compared to students, although the difference between these populations was strongest in the UG. The IMO in the Yasawan UG was 10 percent, while among students it was 30 percent. In the TPG, the IMO was 0 percent among Yasawans and 10 percent among students.

At the individual level, economic and demographic variables explain little of the variation in game behavior. The variables we tested were sex, age, education, income, wealth, status, network centrality, and household size. We also examined the average degree of relatedness of a player to both the yavusa and others in the game session and obtained negative results. Interestingly, when DG offers are combined with age and sex, we can predict much of the variance in UG offers.

FIGURE 9.9 *Yasawan and Emory Ultimatum Game Offers, Overlaid with Expected Income Curves Derived from Distribution of Rejections*



Source: Authors' compilation based on the data.

Proximate Motivations and the Patterns

In considering how different motivations might have influenced our UG experimental results, it makes sense to use income-maximization as a benchmark, especially since player 1 behavior among Westerners in the UG

appears at least roughly consistent with income-maximizing in the game, given the likelihood of rejections across offers (Roth et al. 1991). This appears to be true for both students and older adults in the United States. In contrast, UG offers in Yasawa do not appear to be consistent in any way with an income-maximizing strategy (see figure 9.9). Only 11 percent of offers fell on the IMO (10 percent of the stake) or on the second-ranked IMO (0 percent). Meanwhile, over 45 percent of offers fell on the fifty-fifty split, which ranks sixth in expected income and generates 27 percent less income than the IMO. The mean offer was about 30 percent greater than the IMO.

While not as sharp as the nonstudent adult findings in Jean Ensminger and Kathleen Cook's study (see chapter 18, this volume, available at: http://www.russellsage.org/Ensminger), the behavior of the Emory sample was much more consistent with an effort to maximize income. Figure 9.9 shows that 90 percent of Emory offers fell along the income-maximizing plateau, between 20 and 50 percent.[15] The mean offer was only about 10 percent greater than the IMO of 30 percent. In terms of motivations, a variety of additions to pure income-maximization can explain why most students tended to offer more than the IMO. These include aversions to variance, ambiguity (uncertainty), and inequity. If students tended to prefer (even weakly) choices with a low variance in outcome or less ambiguity in payoffs (Camerer 1995; Camerer and Weber 1992), they would tend to pick offers of 50 percent. If students preferred more equitable outcomes (Fehr and Schmidt 1998), in addition to their own self-interest, then they might also gravitate toward the offers of 40 percent and 50 percent.

These three aversion-motivations are difficult to apply to the Yasawan UG situation. At the core of the issue is that Yasawans showed a sharp decline in expected payoff for offers greater than 10 percent, not a plateau, as among students. This means that whatever the Yasawans' driving motivations were, they had to completely overpower income-maximization. For ambiguity aversion, this case is difficult to make because people in these villages have known each other their entire lives, frequently worked and socialized together, and shared much more similar backgrounds and cultural beliefs than our collection of Emory freshmen. Few, if any, of our freshmen had ever met one another before they arrived at Emory. If anyone should suffer from an inability to assess the local group's IMO or likelihood of rejecting an offer, it should have been the Emory students.[16] Moreover, we

again used “understanding” (measured by the number of examples required for explanation) to predict the variable offer–IMO and found no relationship.

An aversion to the variance in outcome is also unlikely to explain Yasawan game behavior. Looking back at figure 9.4, we observe that there is little (no statistical) difference between the probability of rejection at offers of 10 percent, 20 percent, 30 percent, and 40 percent, and yet a high percentage of offers fall in this range—if an individual cared about income and variance in income, he would still pick 10 percent. For the 50 percent offer, one could argue that over 45 percent of Yasawans had an extreme variance aversion that overpowered the IMO and drove them to the 50 percent. Such individuals require a utility function that weights expected income and standard deviation in income nearly equally.[17]

Finally, a wide range of data from students suggests that inequality aversion is an important motivation (Bellemare, Kröger, and van Soest 2008; Fehr and Schmidt 1998; Fischbacher, Fong, and Fehr 2009). In the UG, however, inequality aversion usually explains the prevalence of player 2 rejections, while simple income-maximization takes care of player 1 behavior. This is because inequality aversion is assumed to be strongest when the inequality favors the other player, and weaker when the inequality favors the decisionmaker. The Yasawan result does not fit this picture. First, consider the behavior of player 2s toward offers of zero. Seventy percent of player 2s accepted such offers. At an offer of zero, player 2's choice is determined only by the allocation that the *other* person receives. If people care *at all* about inequity, everyone should reject zero (as students do). As noted earlier, if people were concerned only about income, they might accept and reject at random, yielding a rejection rate of 50 percent on average. Yasawan villagers, however, accepted zero offers at a rate statistically better than chance. Apparently, most Yasawans may have been more concerned about prosociality (total payoffs to the pair) or altruism than inequity. For inequality aversion to explain proposer behavior, Yasawans would have to have had positive inequity motivations much greater than any observed among students—these motivations would have to have moved them from offering 10 percent to offering 50 percent in the UG, with no help from rejections. Given what we just discussed concerning negative inequality among player 2s, this would mean that Yasawans would be characterized by massive positive inequality aversion and no negative inequality aversion. This is not impossible, but certainly extremely different from the usual

student patterns. The implication is that Yasawans are highly motivated to be equitable to one another (following what people say they *should* do), but not motivated at all to sanction others for inequitable behavior (even when they feel anger or sadness).

As seen elsewhere in this volume (chapter 4), both the Emory and Yasawan experiments hint at the possibility that adding punishment to the game drives out other-regarding preferences. We see this in comparing the DG and TPG offers. Among Yasawans, the mean offer dropped from 35 percent to 27 percent, while among the Emory students the mean dropped from 32 percent to 27 percent. The idea is that, in addition to changing the payoffs in a manner that might increase offers, adding punishment also changes players' interpretation of the game in a manner that makes them less inclined toward others or toward fairness principles and norms. (Adding punishment, in other words, turns down their other-regarding preferences.) Elsewhere we have shown that when the DG is interpreted as “charity” while the UG is seen as “competition” (Henrich and Henrich 2007), one can get DG offers that are greater than those in the UG. Subsequent research suggests that adding a third-party punisher may reduce offers by driving out concerns about supernatural punishment, as responsibility for enforcement shifts from supernatural agents to a more earthly player 3 (Henrich et al. 2010; Laurin et al. 2012; McNamara, Norenzayan, and Henrich 2013).

Some have tried to suggest that offers in the DG are driven by a lack of anonymity between the experimenter and the subject, or between the subject and the experimenter (Levitt and List 2007). However, if this drives the positive offers in the DG, why does adding a threat of punishment (while leaving the experiments exactly the same otherwise) cause offers to decrease?

Where Do Social Preferences Come From?

Such experimental data can be explained by positing different kinds of social motivations, beyond self-interest, or what economists call *social preferences*. As we have shown, nonsocial preferences (for example, variance aversion) does not fare very well in explaining game behavior in Yasawa or among student player 3s. Our data suggest that basic, contextually specific other-regarding motivations or social preferences, however they are conceived, probably vary in important ways across populations. This naturally leads to

the question of where social preferences come from—a question sharpened by both the fact that such preferences develop relatively late in children (Fehr, Bernhard, and Rockenbach 2008; Henrich 2008; Sutter and Kocher 2007) and the fact that chimpanzees show little evidence of the kinds of preferences revealed by humans (Bräuer, Call, and Tomasello 2006; Brosnan et al. 2009; Jensen, Call, and Tomasello 2007; Jensen et al. 2006; Silk et al. 2005; Vonk et al. 2008). To address this we first briefly consider the acquisition of the social preferences that govern game play among Western subjects. Then we examine the social and cooperative patterns of life in the Yasawan villages where we worked, which we think both reflect and transmit the social preferences that emerged in our experiments. Finally, we bring the social learning aspects of our theory together with insights from cultural evolutionary game theory.

Research on the development of social preferences comparing Americans of different ages suggests that social preferences develop gradually over the first two or three decades of life and then remain relatively stable (Bellemare and Kröger 2007; Bellemare et al. 2008; Carpenter, Burks, and Verhoogen 2005). In the UG, this work shows that second-graders are pretty selfish, but that by twelfth grade offers are approaching their adult plateau (Harbaugh and Krause 2000; Harbaugh, Krause, and Liday 2002; Henrich and Henrich 2007; Sutter and Kocher 2007). DG offers hit their plateau even later, with full-fledged adults making higher offers than college students. In combination with what we know about the effect of social learning and imitation on the early acquisition of prosocial behavior in children (Eisenberg 1982; see the review in Henrich and Henrich 2007, ch. 2; see also Eisenberg and Mussen 1989; Rakoczy, Warneken, and Tomasello 2009), these findings suggest that social preferences are gradually acquired over at least two decades of learning and experience in particular social environments. Thus, a sensible working hypothesis is that during the first twenty years of life people gradually acquire important aspects of their social preferences via social learning from those around them and from direct experience in the social environment (Chudek and Henrich 2010; Chudek, Zhao, and Henrich 2013).

This simple hypothesis leads to two predictions about experimental game behavior:

1. Game behavior should reflect, in a general sense, the social environment experienced by the player during ontogeny (Henrich 2008), with perhaps

some modest accommodation to the player's current social environment, if it substantially differs from the one in which he or she grew up. In many cases, because societal evolution moves slowly and often involves “equilibrium selection” (discussed later), games tend to reflect social life in the current society of the players (Henrich et al. 2005).

2. Cultural learning in shared social environments means that individual economic and demographic characteristics do not predict game behavior unless they correlate with significant differences in the ontogenetic environments of the players. For example, social class, caste, or ethnicity may be important, as these sometimes correlate with differences in the social environments of ontogeny, and measures like market integration do not matter unless the measure reflects differences in the ontogenetic social environments faced by the players. This implies that variation in market integration between groups is important, but not within groups. Education may matter, especially in some nonlinear fashion (the difference between zero and one year of schooling is larger than between eleven and twelve years), since formal schooling can be a key part of ontogenetic environments.

Taken together, these two predictions mean that groups will vary because they have evolved culturally to different equilibria, but individuals within groups do not vary substantially for the same reasons—equilibria are group-level phenomena (Henrich et al. 2010).

Let's consider the social world experienced by people growing up in a Yasawan village, where social life is intensely cooperative. People routinely work together in a variety of tasks. Planting occurs either within the itokatoka (a subclan, or extended kin group) or sometimes within the mataqali (the clan). There are numerous community projects, such as planting the chief's yams, maintaining the village and school, building houses, and preparing feasts (fishing, cooking, weaving mats, making coconut oil) for a variety of occasions, including every marriage, first birthday, and funeral. Table 9.16 summarizes the twenty most important domains of cooperative activity in Teci and Dalomo.[18] This table is based on interviews with twenty-four randomly selected adults who were asked how often the activities had occurred in the last week, month, or year, how many men and women usually participated, and how many times they had participated themselves. We also asked if any activities were missing from

the list. Table 9.16 shows the 20 percent trimmed means for the frequency of the activities (standardized to times per year), the number of female and male participants, the total number of participants, and an overall cooperation score (obtained by multiplying the total number of participants by the frequency per year). These data suggest that cooperative activities of some kind occur in Teci and Dalomo about 206 times per year. Moreover, both our observations and interviews suggest that Yasawans love working together. People readily tell you this, and cooperative work groups are jovial affairs with lots of chatter, laughter, and friendly pranks.

The ethnographically naive might think that this level of cooperation is merely a universal part of village life in small-scale societies. This is definitely *not* the case. We have spent months studying cooperation in both Machiguenga villages in the Peruvian Amazon (where people also rely primarily on root-crop horticulture and fishing) and in small Mapuche farming communities in southern Chile. Life in these locales does not even begin to approximate the intensity of social interaction, or the degree of cooperation, we have now observed in two Yasawan villages. Both Machiguenga and Mapuche households operate as primarily independent economic and political units, while Yasawan villagers integrate their activities across the yavusa in a variety of ways. In the two South American groups, we and others have documented a lack—or frequent failure—of many of the activities listed in table 9.16. During one of our four field seasons in the Machiguenga village of Camisea, the elected leader was repeatedly unable to assemble men to perform village maintenance (cleaning, grass-cutting) and to construct a new schoolhouse (see the similar observations made twenty years earlier in a different Machiguenga community by Allen Johnson [2003]).[19] In a Yasawan village of similar size, all males show up for the *exact same* activities and work for hours. Both Machiguenga and Mapuche express a distrust of communal work and reveal a quiet suspicion of those pushing for it. This contrasts sharply with the Yasawans' joviality during cooperation and their deep respect for the elders and the chiefly lines of village authority. Complementing our ethnographic work, we have done experimental games in all three of these places, and the results reveal the stark differences observed in daily life (Henrich and Smith 2004).

TABLE 9.16 *Cooperative Activities in Teci and Dalomo*

Number	Cooperative Activity	Times per Year	Number of Males	Number of Females	Total Number	Cooperation Score
1	Cleaning the village every Monday	48.0	19.0	11.3	30.3	1453.7
2	Working at school every Tuesday	46.3	13.4	7.9	21.2	981.9
3	Meke (dance) in resort	48.0	9.1	6.7	15.8	757.7
4	Meke (at Dalomo)	28.3	1.1	7.8	8.9	250.5
5	Gathering palms for bure (traditional house) at resort	12.1	20.4	0.0	20.4	246.6
6	Soli vakakoro (village fund-raiser)	1.9	40.0	40.0	80.0	154.3
7	Post soli vakakoro (village feast after community fund-raiser)	1.9	36.3	37.0	73.3	141.3
8	House building	3.6	19.6	9.5	29.1	105.9
9	Post–house building feast	1.8	23.1	21.9	45.0	80.4
10	Government ministers' visits	2.3	18.6	14.9	33.4	76.4
11	Teacher meeting	3.0	12.0	12.1	24.1	72.4
12	Condolences	2.1	16.2	17.3	33.5	71.7
13	Plant yams at chief's farm	1.9	24.2	5.0	29.2	56.3
14	Funerals	1.0	23.9	23.3	47.2	47.2
15	Marriage (making mats, fishing)	0.9	25.6	22.8	48.4	41.5
16	First birthdays	0.9	17.0	16.9	33.9	31.5
17	Returning vasu (mats and fish to celebrate the arrival of a son to his mother's village of origin)	1.0	21.4	20.1	41.5	41.5
18	New boat feasts	0.2	21.4	21.1	42.5	9.1
19	Other birthdays	0.9	2.1	1.9	4.0	3.4
20	Twenty-first birthday feasts	0.1	15.1	13.2	28.3	2.0

Source: Authors' calculations based on the data.

How is all of this cooperation maintained? If people tend to learn from highly successful individuals—and much evidence suggests that they do (Henrich and Gil-White 2001), including evidence from precisely these villages (Henrich and Broesch 2011; Henrich and Henrich 2010)—or through adaptive forms of individual learning that favor higher payoff strategies, then theoretical work using cultural evolutionary models indicates that n-person cooperation should *not* be maintained unless noncooperation can be deincentivized or sanctioned in some way (Henrich and Boyd 2001; Boyd and Richerson 1992; Panchanathan and Boyd 2004).

To explore this, we asked Yasawans two questions: Has someone ever broken a village rule or been punished for not contributing to village affairs (not planting the chief's yams, for instance, or assisting at the school)? And what would happen if someone consistently failed to contribute to village life? Several patterns were clear from their responses. First, gossip plays a role in achieving at least a preliminary consensus that the person is

misbehaving. This preliminary consensus results in damage to the person's reputation. Second, individuals—often motivated by some unaddressed grievance or long-running jealousy—often take direct action, which may involve surreptitious actions or outright assault. Surreptitious actions act as anonymous punishments, which may involve the theft and burning of a family's crops or the theft or destruction of their property. Normally such acts would be investigated, but when they are done to someone with a bad reputation, little if any effort is extended by community members to uncover the culprit. Most people in the community do not know who imposed these sanctions. If the punishing actions involve public assault, the punisher is reprimanded but much less than if he had done the same thing to someone who was not a norm-violator. Then, if the behavior continues, the chief and council of elders meet to decide what the village is going to do. This elders' meeting is followed by a village meeting at which anyone can voice his or her view; if found guilty, the offender is publicly admonished. For nonparticipation in village projects, officially nothing further would be done, beyond the exploitative acts mentioned earlier (theft and destruction of property). However, in the case of serious infractions, such as rape, the accused is tried by the elders in a village meeting. If deemed guilty by consensus, he is beaten to the point of collapse, usually with a special stick or pipe. Finally, people recognize an additional form of punishment for norm violations: the anger of the chief or community may lead to supernatural sanctions. Incurring this anger for violations can lead to illnesses (which can last for generations in a blood line), shark attacks, and injuries (for example, burns on children). These are effective deterrents as long as people believe in the causal connection.

Overall, the system of beliefs, values, and practices that support cooperation and other norms combines public shame, gossip, and a system of negative indirect reciprocity, which is further bolstered and reinforced by informal village institutions for punishment. This system is interesting: it sustains numerous prosocial, fair, and cooperative norms but does not require individuals to engage in costly punishment based on their own judgments. Taking advantage of the consensus created by gossip, the system of negative indirect reciprocity creates a sanctioning mechanism based on providing personal incentives, including opportunities to steal with impunity, for those who envy or begrudge the norm-violator. The formal punishing system also requires an even sharper group consensus before punishment is

performed by a predesignated member of the community (who is assigned based on kinship). Growing up in this world, villagers acquire the preferences, expectations, and beliefs of this stable interlocking system of norms. Since the system establishes fairness among community members without costly punishment, we should expect Yasawans to reveal those preferences in our experiments. The lack of punishing in our experiments arises from both the anonymity (villagers sanction some people, but only *specific* other people) and a lack of any consensus information on how bad the norm violation was. Recent work using cultural evolutionary game theory shows how a system of negative indirect reciprocity can emerge and sustain diverse and costly social norms, including cooperative ones (Chudek and Henrich, n.d.)

One way to misinterpret what we are suggesting would be to think that Yasawans were equitable in the games because they anticipated damage to their reputations if they made low offers—that is, that they did not understand or believe the one-shot or anonymous nature of the games. Such an interpretation misconstrues the adaptive nature of human learning. People learn the motivations and social preferences that allow them to survive and thrive at the current culturally evolved equilibrium of their society (Chudek et al. 2013; Chudek and Henrich 2010). These acquired motivations should allow them to rapidly make decisions in local social situations with incomplete information, accurately anticipate the behavior of others ("know how they feel"), and effectively protect their future reputations without endless steps of forward-or-backward induction (which we know humans cannot do; see Camerer 2003). Evolution appears to have dealt with the multiplicity of social equilibria that cultural evolution can create by building cultural learning mechanisms that allow learners to internalize the culturally appropriate social preferences or values that create locally adaptive forms of intrinsic motivation (Gintis 2003; Henrich 2004; Henrich and Henrich 2007).

These data also challenge another widespread interpretation of behavioral-economic results. Some have argued that humans inevitably "assume" (in some sense) that they are in a long-term repeated interaction because of our evolutionary history of living in small-scale, isolated foraging bands in which—they claim—low-frequency interactions were rare and not fitness-relevant (Burnham and Johnson 2005; Henrich and Henrich 2007; Johnson, Stopka, and Knights 2003). The more sophisticated version of this argument holds that our evolved psychology has a "nonzero baseline" or

“default setting” that assumes—barring cues to the contrary—that interactions are repeated frequently (Fehr and Henrich 2003). People can understand that some interactions go on longer than others (and are sensitive to certain cues about this), but they cannot fully grasp the idea that an interaction might last only one or a few rounds (or at least telling them that the game will not be repeated is not one of the relevant cues). Thus, from this perspective, behavior in one-shot games can be explained by pure self-interest—people are purely self-interested, but they mistakenly think that they are in a game that repeats many times. This approach, for example, has been used to explain the tendency of player 2s to reject in the UG—in a repeated UG, a self-interested player 2 should reject low offers, at least early in the game. However, the pattern of variation in the UG reported in this chapter does not support this argument. The Yasawans, who actually live in a small-scale, face-to-face society, do not reject low offers in the UG. Meanwhile, Emory students, who live in a society with many one-shot and anonymous interactions, consistently reject low offers. The hypothesis that people expect interactions to be long-term and repeated predicts that people from a face-to-face society will reject more, not less. One would think that people who actually live in a small-scale society are the ones most likely to mistakenly think that they are in a repeated game context, yet the smaller-scale the society the less punishment there is in one-shot games (Henrich et al. 2010).[20]

This work suggests that high levels of fairness and equality can be maintained without the kind of direct and third-party punishment typically observed in industrialized societies. In combination with ethnographic data on Yasawan social life and from child development, the emerging picture suggests that a variety of social preferences may be acquired during ontogeny via cultural learning. At the ultimate level, this is consistent with recent evolutionary modeling showing that high levels of prosociality can be maintained without direct and third-party punishment *in small-scale societies* by linking it to reputation effects in a system of indirect reciprocity (Chudek and Henrich, n.d.; Panchanathan and Boyd 2004). Future work should focus on studying the ontogeny of social preferences across a range of small-scale societies.

NOTES

1. Both a radio-phone and a village store were operating at the time of this research. Since then, however, the store has gone out of operation and the radio-phone has been replaced, first by a government-installed satellite phone and later by mobile phones.

2. In 2009 the path was expanded and extended. The resort burned down in 2010 but is being rebuilt.

3. The film was *Castaway*, starring Tom Hanks. It was in English, so most of the crowd could not follow the dialogue. It was selected for its relative lack of dialogue, and because many of the scenes were shot in Yasawa. One might worry that the film somehow primed participants' behavior in some way. Two factors suggest that this is unlikely. First, our analyses reveal no order-of-play effects. Participants left the movie area one at a time over the course of several hours (the first player saw none of the film) to make their game decisions, and they did not return. If the movie mattered, order of play should be predictive. Second, Yasawan offers fit nearly perfectly with their predicted values based on our overall regression analyses (chapter 4). If the movie had an impact on play, we might expect Yasawans to be particular deviant. It is also worth noting that while some might see the film as a “prime,” the alternative was asking people to sit around and gossip with their kin, which could also have been a prime.

4. The Epps-Singleton test is a nonparametric test that, in simulation studies, has been shown to be particularly powerful for the small samples involving the distributional shapes typically found in UG data (Forsythe et al. 1994).

5. Our DG and UG experiments were all conducted with Emory freshmen recruited from the same dormitory (a community of sorts) in the middle of spring term. This was done to parallel the fact that in our villages people were playing with fellow villagers, albeit anonymously. Our TPG experiments were done with a range of students from across campus recruited using a posted flyer. It was impossible to use a single Emory dorm for the TPG, owing to size constraints.

6. As noted, in comparing the taste for punishment exhibited in the UG and TPG, it is important to consider the cost to player 3 and the cost inflicted on player 1. For offers of zero, punishing costs player 2s zero and player 3s 20 percent of the stake. The cost inflicted on player 1 is 100 percent of the stake in the UG and 30 percent in the TPG. For an offer of 10 percent, the cost to player 2 in the UG is 10 percent, while the cost to player 3 remains 20 percent. Meanwhile, the cost inflicted on player 1 is 90 percent in the UG and 30 percent in the TPG. For offers of 20 percent, the costs of punishing are equal, but the costs inflicted on player 1 are 80 percent in the UG and 30 percent in the TPG.

7. Wealth captures the sum of all income-generating assets owned by members of the household. Household size is everyone in the household, including children. For the details of how we operationalized these measures, see chapter 3.

8. We did this by resampling the data and estimating the coefficients one thousand times with replacement. This gives us one thousand estimates of our coefficients. The standard deviation in this bootstrapped sample gives us an improved estimate of the standard error.

9. The OLS regression yields corresponding coefficients and standard errors of −17.6 and 5.13 for age, and −7.8 and 3.7 for education. We used the bootstrap analysis because, given the small sample and non-normality of the data, these coefficients and standard errors are probably more accurate. Robust regressions that minimize the sum of the absolute differences between data and the regression line yield comparable results.

10. We believe that this correlation is an upper bound because in our experimental design participants played the DG and UG consecutively. If play in each game had been spaced by weeks or months, we expect that the correlation would be the same or less, but not more. This assumes that at least some players might want to be consistent and that the accuracy of their recollection of what they did decays over time. Of course, it is possible that players could somehow be averaging over the two

games. Feeling that he or she went high (was generous) in the DG, a player might decide to go low in the UG. However, figure 9.7 suggests no such trend.

11. If an individual rejected both high and low offers (U-shaped), we set his or her MAO at the lower threshold. This was the case for only four people—twenty-seven had only lower thresholds (linear) and three others had rejection patterns that were neither U-shaped nor linear. All Emory students had a linear pattern of rejections.

12. Because of a shortage of players, some people who played in the TPG had played in our DG and UG sessions. Whenever possible, we assigned returning players to the role of player 2 and tried to avoid allowing player 1s from the DG/UG sessions to be player 1s again. Nevertheless, there were four individuals who were player 1 in all three games; interestingly, three of these players offered the same amount as they did in the DG (50 percent offers), and one lowered his offer from 30 percent in the DG to 0 percent. Nine individuals were player 2 in the DG/UG sessions and player 1 in the TPG. We compared the offers of our seventeen first-timers to the offers of the thirteen repeat players and found no difference. For the nine who were player 2 in the DG/UG, we found a correlation of −0.05 (nonsignificant) between their MinAO and their TPG offers, and a correlation of −0.06 (nonsignificant) between the amounts they received from player 1 in the UG and their offer in the TPG.

13. We also normalized the data so that everyone made an equal contribution to the overall in-degree scores; otherwise, individuals who named more people would have a greater effect on the scores.

14. In Fijian villages it is difficult to find a clear distinction between “appropriate” and “morally correct.”

15. The plateau in expected income, created by the taste for punishment in the Emory freshmen, contrasts with the sharp peak observed at 50 percent in Ensminger and Cook's data from nonstudent adults in Missouri (chapter 18, this volume, available at: http://www.russellsage.org/Ensminger_Chapter18.pdf). The most likely explanation for these differences is a developmental one—university freshmen are not completely socialized. Social preferences, as measured in these experiments, continues changing with age until at least age twenty-two, when it levels out. (Age is not a predictor of game behavior after about the mid-twenties.) Moreover, UG mean offers seem to be on a somewhat different trajectory than player 2 rejections, with offers reaching their stable adult level before the taste for punishment (Carpenter, Burks, and Verhoogen 2005; Carter and Irons 1991; Henrich 2008; Sutter and Kocher 2007).

16. Note that, like the Yasawans, Emory students also failed to make consistent links between the games and real-life situations, so there is no sense in which the game was more or less ambiguous to either group, at least based on our postgame interviews.

17. If Utility = (expected income) + ß*(standard deviation in income), then β has to equal at least 0.86 before a Yasawan would switch to offering 50 percent. (This assumes he knows the probability of rejection.) We are aware that this is a nonstandard formulation of utility; it nevertheless captures the point.

18. We generated the initial list by asking six subjects to free-list cooperative activities. The initial list included eighteen activities. During our formal interview, two additional activities arose when we asked people if any cooperative activities were missing from our list. We added these.

19. In the case of the schoolhouse, after a few weeks of failure to assemble a building team, the mestizo schoolteachers, in frustration, stopped holding classes and compelled the students to construct their own school.

20. In general, this mismatch hypothesis is flawed. Its conception of ancestral environments is built on popular anthropological myths about relatedness and strangers in foraging societies (Boyd and

Richerson 2002; Chudek et al. 2013; Fehr and Henrich 2003; Henrich and Henrich 2007; Hill et al. 2011).

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Chapter 10

Economic Game Behavior Among the Shuar

H. Clark Barrett and Kevin J. Haley

Previous cross-cultural research on decisionmaking in economic games by Joseph Henrich and his colleagues (Henrich, Boyd,…McElreath 2004; Henrich, Boyd,…Henrich 2005) revealed both substantial variation across cultures and substantial deviation from the predictions of traditional economic models. Some of the most "selfish" behavior, as measured by offers in the ultimatum game, was observed in the smallest-scale societies, such as the Machiguenga, Quichua, and Hadza. These societies are characterized by both relatively small social groups and relatively low market integration. However, the same can be said of the Ache and the Achuar, who exhibited offers trending typically toward even splits. Although these cultures share many features, such as small social scale and subsistence ways of life, they also differ in myriad ways, including, among many other factors, different cultural histories and ecologies. What combination of factors best explains the distribution of offers seen within and between cultures?

The Shuar of Ecuador are an interesting population to investigate in this regard, especially when compared to the Achuar, Quichua, and Machiguenga populations examined in prior research. Culturally, the Shuar are most similar to the Achuar. The two populations have languages that, for the most part, are mutually intelligible, they share many customs and cultural practices, and they are descended from the same ancestral culture. Both, like the Machiguenga, are highly individualistic cultures in many ways, and traditionally neither has a political organization above the level of household or extended family (Harner 1972; Johnson 2000). Compared to the Achuar, however, the Shuar have a longer history of economic and cultural exchange with the Spanish colonial culture of highland Ecuador, as well as a higher degree of market integration (Blackwell et al. 2009; Bremner and Lu 2006; Lu 2007; Rubenstein 2001; Rudel, Bates, and Machinguiashi 2002). Geographically, they exhibit substantial overlap with the Quichua,

sometimes living in the same villages and in essentially the same economic circumstances. In prior research, however, Quichua exhibited very different economic decisionmaking than Achuar living in the same community (Patton 2004). Interestingly, the Quichua are known locally for higher degrees of market integration and market savvy than the Achuar, and yet they exhibited lower offers in the UG, behavior that is generally more consistent with less market integration.

Chinimpi, the Shuar village where we played the games presented in this study, is situated toward the middle to upper end of the spectrum of market integration among Shuar communities. The most market-integrated Shuar communities are those situated in or near the relatively large and long-established cities of Macas and Sucua, where there have been Shuar merchants and businesspeople for many years. One study, conducted in provinces north of our study site, found that rates of wage labor among five indigenous groups (Quichua, Shuar, Secoya, Cofan, and Huaorani) were highest for the Shuar (Lu 2007). However, many Shuar live in jungle villages accessible only by foot, canoe, or small plane; in these remote locations, wage labor is not possible and there is only sporadic trade with markets. For most Shuar villages, true market integration begins with the arrival of a road, which occurred in Chinimpi in the early 1990s. At the time of this study, 2002, Chinimpi was a village in transition—though still very much Shuar in its customs, the village was becoming increasingly experienced with the Ecuadorian cash-based economy. We were intrigued by the question of how the Shuar of Chinimpi would play economic games such as the dictator game (DG), the ultimatum game (UG), and the third-party punishment game (TPG). Would they exhibit relatively low offers, like the Machiguenga and Quichua, or higher offers, like the culturally similar yet less market-integrated Achuar?

THE STUDY POPULATION

The Shuar are a hunter-horticulturalist society in the Upper Amazon region of eastern Ecuador and northwestern Peru. Traditionally, the Shuar had little or no political or social organization above the level of the household except for limited purposes, such as trade in specific resources, such as blowgun arrow poison, or temporary alliances in warfare (Harner 1972; Karsten 1935). Even within villages, the Shuar ethos could be characterized as highly

individualistic, at least at the level of individual family units, and this ethos persists today. Anyone who has spent time in a Shuar village, or among the culturally similar Achuar (Patton 2004), will note that there is a strong cultural norm toward the right of individuals to make decisions on their own. This manifests in frequent within-village feuds and in the frequency with which people in traditional Shuar villages simply leave, with their families, when conditions are not to their liking.

These cultural norms seemed to work well in the low population densities and relative isolation in which many Shuar lived until recently. In areas of the Amazon Basin, where huge areas of land are uninhabited by people, it is possible for a family to live in relative isolation, supporting itself with the help of a few nearby households. It is also relatively easy to move to a new location if troubles arise with neighbors. Today, however, the living conditions of most Shuar people are in transition as roads, electricity, and commerce encroach ever more rapidly into the Amazon region and as population densities increase and land is divided into permanent parcels by the government. These changes have led many Shuar to live in situations to which their norms of family-level independence may not be ideally suited.

Where roads and commerce have been long established, as in Macas, Sucua, and the surrounding areas, Shuar culture has had substantial time to accommodate to the cash economy of Ecuador (Lu 2007; Rudel et al. 2002). In more remote areas, certain cultural changes resulting from the efforts of missionaries are noticeable (such as reduced homicide rates), but subsistence practices, as well as other traditional elements of Shuar culture, remain relatively unaffected by the modern Ecuadorian economy, as one might expect given the absence of roads and the poor navigability of most rivers in the upper Amazon area. To anyone who has visited this region, roads are an obvious factor in culture change. In areas located within a day's walking distance from a road, or where a road has recently arrived, the change in economic and subsistence-related practices is palpable, though the Shuar language and many aspects of Shuar culture remain relatively unaffected, based on comparison with previous ethnographic work with the Shuar (Harner 1972; Karsten 1935).

The Basic Setting

This study was conducted in 2002 in the Shuar centro (village) of Chinimpi, which is located in the northwest corner of Morona Santiago Province, just south of the town of Palora, at latitude 1°48' south, longitude 77°57' west. Of the many aspects of this village that we might mention, some are quite typically Shuar, and others make it rather unusual for a Shuar village. Because the basic features of Shuar culture have been described elsewhere (see Harner 1972; Karsten 1935; for an ethnography of the closely related Achuar culture, see Descola 1996), we refrain from describing those features here. Note also that our descriptions of conditions and data, while given in present tense, apply to Chinimpi as it was in 2002.

Internally, the political organization of Chinimpi is typical of Shuar villages today (Rubenstein 2001). Landholding heads of household (mostly men but a few women) are socios (members) of the village, which gives them voting rights as well as the obligation to participate in mingas, or community work parties. There are approximately fifty socios, and the total population of the village is about three hundred (relatively large for a Shuar village), though a smaller population participates regularly in village life. The village elects several officials each year by a vote of the socios, including a president, vice president, secretary, and treasurer. There is a school that has recently begun to offer high school–level classes taught by bilingual teachers fluent in both Spanish and Shuar. (The average adult in Chinimpi has had approximately six years of formal education; see figure 10.1 for the distribution of study participants' years of schooling.) And electricity has arrived, though it is frequently cut off by the power company for lack of payment.

Subsistence, Income, and Wealth

Owing to the depletion of animal resources, the Shuar in Chinimpi have lost many of their traditional methods of making a living, and though most of them are familiar with a cash economy, they have limited opportunities for engaging in modern market activities. (At the time of the study, there was not yet readily available daily transportation to the nearby market town of Palora.) Many household heads periodically cut and sell wood—a sporadic source of income at best. Although the sale of wood for lumber was fairly common until about 2000, this practice has recently tapered off as trees within hauling distance from the road have been depleted and the

Ecuadorian government has passed a law regulating the size of fellable rain-forest trees.

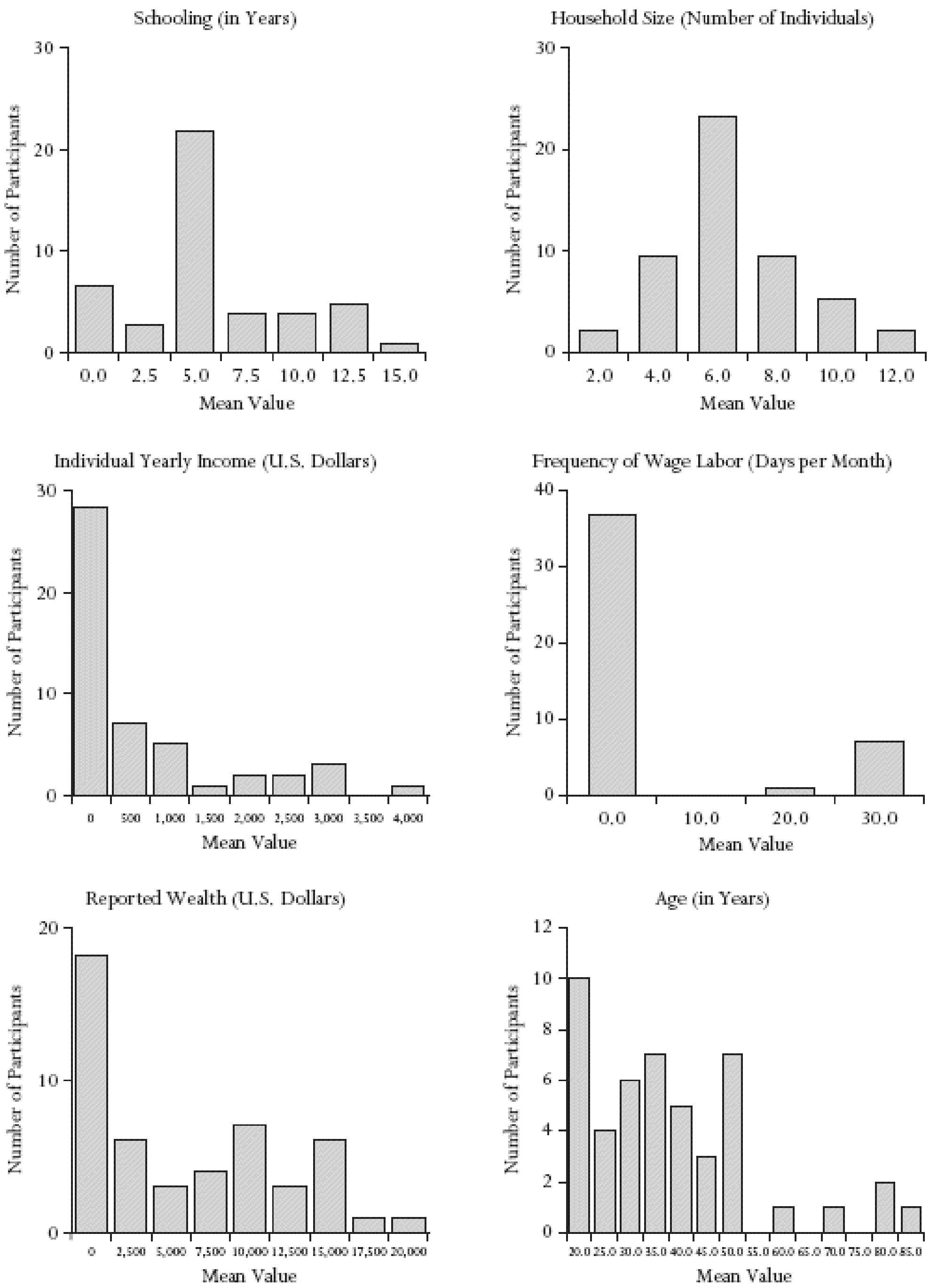
As a result of limited opportunities to engage in market activities, villagers in Chinimpi generally have low levels of income and wealth by the measures we used. The average reported annual income per household in Chinimpi in 2002 was U.S.$737.00 (standard deviation = 956.00; see figure 10.1). Most households engage in no active renting, selling, or trading of goods in markets. A few households own cattle or pigs, which are typically sold in a market setting, though this practice is not widespread. There is also significant wealth disparity in this regard: mean reported cattle wealth was $U.S.712.04 (standard deviation = 1,420.00). Nearly all household heads own a finca (a ranch), averaging 32.09 hectares in area (standard deviation = 23.78) and worth approximately U.S.$4,846.53 (standard deviation = 4,974.00) (for the distribution of overall household wealth and distribution of household sizes, see figure 10.1). Only very rarely do households sell their land. Most families rely mainly on their own labor on their fincas to provide them with their food resources and other subsistence materials. The average household in Chinimpi acquires less than one-quarter of its nutrition from the Sunday markets of Palora. However, some individuals participate frequently in wage labor (figure 10.1). The distribution is bimodal, with most individuals engaging in zero wage labor but another, smaller group almost continuously employed.

Cooperation, Norms, and Institutions

As mentioned earlier, while the Shuar live in small, face-to-face communities consisting of intermarried, extended families, they also strongly value individual autonomy. This extends to economic matters as well. For example, in a study of land use practices in five indigenous societies in Ecuador, Jason Bremner and Flora Lu (2006) found that, among the Shuar, 96 percent of land cultivation was on land considered private, with only 4 percent on communal land. In contrast, among the Huaorani, who live to the north of the Shuar, 95 percent of land cultivation was on communal land. However, the Shuar way of life does require substantial degrees of cooperation in areas like hunting, land-clearing, and house-building. For example, the Shuar exhibit food-sharing norms that are fairly typical of hunter-horticulturalist societies (Hames 1990; Kaplan and Hill

1985): high-variance foods are shared widely among families, especially meat, whereas low-variance foods, such as garden foods (manioc, plantains, and so on), are mostly consumed within the family. And the cultural institution of the minga, or communal work party, suggests that the Shuar possess specific, highly developed norms of cooperation for certain social contexts.

FIGURE 10.1 *Demographic Characteristics of the Shuar Sample for All Three Games (Pooled)*



Source: Authors' compilation based on author data.

Seen throughout Ecuador, mingas are community-level cultural institutions that appear to be stabilized by the power of shame-based sanction and reputation in fairly small groups and that work reasonably well

for activities like clearing grass from airstrips or soccer fields once a month. People who do not show up are chastised, and helping is seen as part of one's duty in being a “good” community member. One cannot profitably shirk for long in a small community where absences are noticed; showing up and making at least some contribution is the only way to avoid negative reputational effects, such as—traditionally anyway—diminished prospects for mates, social exchange partners, and other profitable social interactions. Shuar informants agree, however, that there are substantial differences in actual effort expended by individuals during mingas (Price 2005), and the means of fine-grained monitoring and regulation of effort are poor. Therefore, mingas might not be stable when scaled up to cases where more is at stake and people stand to benefit substantially from the contributions of others, as in profit-based collectives. Even in regular community-wide mingas, at which the participation of all socios is required, the population size of Chinimpi—and ecological and social changes that have left residents relying on their own individual efforts in fincas and on wood-cutting rather than hunting—seems to be undermining the traditional reputation-based sanctioning system.

One recent event sheds some light on group-level cooperative norms among the Shuar and the question of whether these can be readily adapted to culturally novel contexts. Chinimpi's location on a road, its size, and its position as the geographic nucleus of several surrounding Shuar villages that are accessible only by foot led to its being selected as the site for a sugar cane–processing project funded by the World Bank. The funded part of this project, which was the construction of a small zinc-roofed shelter for a motor-powered sugar cane grinder and drying vats, had been completed at the time of the study, but no profit had been generated. No stable labor force had been assembled, and the plant had yet to see any activity other than the testing of the equipment. (As of 2013, the plant still exists and has been operational at times, but it has yet to become a stable business enterprise, despite the formation of a sugar cane growers' cooperative in Chinimpi.) The initial failure of the project was, arguably, largely due to the fact that the World Bank and its subcontractors simply built the plant, conducted some initial training sessions, and then left, abandoning the project to people with insufficient expertise to run it. However, the villagers' inability to solve the collective action problems associated with making the plant into a successful business—such as recognizing the need for individuals to invest in sugar

cane cultivation well before anyone could see any profits—may have been due to cultural factors, in particular, the lack of cultural norms and institutions for running a collective economic enterprise of any kind. An initial attempt to form a sugar cane growers' cooperative to provide raw material for the plant, using the minga model but with discrete personal contributions of growing land to a collective pool, collapsed within a year (see Price 2005).

This example raises the possibility that norms for cooperation are context-specific. Thus, while there are well-established norms for food-sharing and participation in one-time minga events such as house-building or field-clearing, there are no such norms for collective economic activity. This could be described as a possible case of cultural disequilibrium, or cultural inertia: existing cultural norms of cooperation have not yet been adjusted to allow efficient, group-level cooperation in a market economy setting.

Disequilibrium and Cultural Inertia

In Shuar communities like Chinimpi (but not, perhaps, in Shuar communities with a longer history of market integration), the norms and social institutions that underlie and stabilize cooperation and sharing are adapted to patterns of subsistence and social organization that have been stable for a long time: small, family-based villages that subsist entirely on hunted and gardened foods and trade with neighboring communities for essential items like machetes, salt, and blowgun dart poison. For the kinds of activities and interactions that characterize such environments, Shuar social norms are quite adequate, and it is our impression that, for the most part, the Shuar of Chinimpi still use these norms to guide social interactions. Over the past few decades, however, the social, economic, and natural environments have changed substantially, and these changes are only just now beginning to have palpable effects. For example, animal resources have been steadily depleted for some time. This depletion has accelerated in recent years, so that now many game animals and fish are gone. Population pressure prevents expansion of hunting grounds to more distant adjacent areas because they are all occupied. Gradually, hunting as a practice has tapered off. The frequency of fishing has also drastically declined, though people still fish, and some express surprise that streams do not replenish between fishing events. The fact that expectations are violated even among people who have

lived their entire lives in the area points to the absence of personal and cultural adjustment to recent changes in the local ecology.

Consistent with these ecological changes, Shuar in Chinimpi have carved up the local landscape into discrete, individually owned plots where they focus on private subsistence activities. Because of differences in land holdings and other factors, there are now significant income and wealth disparities among families. This disparity has combined with other factors—such as the arrival of the road, electricity, and the sugar cane–processing plant—to contribute to the pervasive state of disequilibrium and anxiety about the future among the Shuar today. Many families are nutritionally stressed (see Hagen, Barrett, and Price 2006), and people are in search of labor or other means to acquire foods and other necessities. As the Shuar are gradually being forced to turn to outside markets, the effects on cultural norms and practices remain unclear.

METHODS

We recruited forty-nine individuals, ages nineteen to eighty (mean age = 37.96; standard deviation = 16.15; see figure 10.1) to play three economic games—the dictator game, the ultimatum game, and the third-party punishment game—spread across two consecutive days of game play. Recruitment took place as follows. Several weeks before the games were to take place, we arranged a villagewide meeting during which we explained the purpose of the larger project to community members and sought community consent to host the experimental games. Potential subjects were informed that we would be playing games with money, and their casual comments indicated that they did not anticipate any details about the structure of the game settings. In the days leading up to the first day of experiments, the president of the community made announcements to community members reminding them of the approach of the games, their voluntary nature, and their serious experimental nature.

The experiments themselves took place in a small building, one of three used for school classes and village meetings, all located at the far end of the village. All subjects congregated in one room as standard instructions were read, after which they observed as each of them drew a numbered ticket from a hat, which was used to determine the order of game play.

On the first day of game play, forty-one subjects (twenty-six males and fifteen females) played the DG in a morning session and the UG in an afternoon session. Standard procedures were followed as closely as possible, and we had no noticeable problems with contamination or collusion. We recruited a number of people to prepare lunch and refreshments, which we made available to persuade subjects to remain in the experiment area and to make it easier for us to monitor subjects during the games. We also appointed several participants to positions as monitors in the waiting areas. With the groups separated, the refreshments and a volleyball game in a central courtyard kept the waiting subjects occupied.

During the second day, forty-eight individuals (twenty-eight males and twenty females) participated in the TPG. Because of the small number of active community members in Chinimpi, we were unable to recruit a large number of fresh subjects to play the TPG on the second day. Only eight fresh subjects were available. Six of these new subjects were also recruited to play the DG and the UG on the second day of overall game play, after they played the TPG. Note that data for three individuals for whom we were unable to find partners were discarded.

In the days following the games, we conducted postgame interviews with a number of individuals. The interviews confirmed our impression that subjects anticipated neither the structure nor the content of the games, as well as our impression that there had been no problems with collusion or contamination. However, our relatively small sample sizes lead us to approach our data with caution.

RESULTS

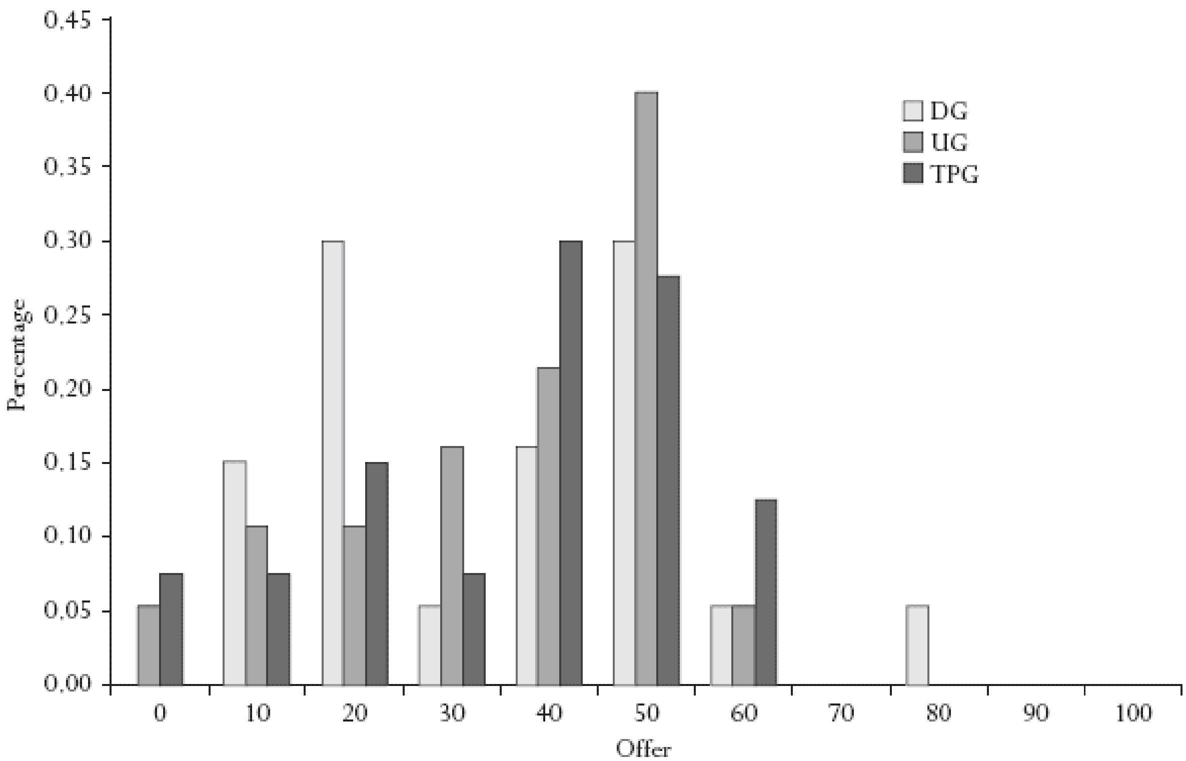
We analyzed data for twenty pairs of individuals who played both the DG and the UG. The mean offer in the DG was 35.24 percent (standard deviation = 19.14) of the stake, with modes at both 20 and 50 percent (see figure 10.2).

We examined possible effects of six different variables on DG offers, using the standardized regression method employed in all of the chapters in this volume, as well as for all of the regressions reported here. First, we rescaled all of the variables, with the exception of sex (which was entered as a dummy variable, 0 = male, 1 = female), by dividing each data point by the standard deviation for that variable among the sample of participants making

DG offers. We then performed a linear regression using all six variables (model 1). In addition, five more regressions were performed (models 2 through 6), removing each of the six variables one at a time, in the following order: age, sex, education, income, wealth, and household size. The results of these regressions are shown in table 10.1. Histograms showing the raw (not rescaled by standard deviation) distribution of the independent variables used in the regressions (with the exception of sex) are shown in figure 10.1.

As table 10.1 shows, none of the variables, with the exception of household wealth in model 1, had a significant impact on DG offers. Household wealth is significant at $p < 0.10$ in model 1, with a coefficient of −0.5, indicating a 50 percent decrease in offers with each standard-deviation increase in household wealth. However, household wealth does not account for a significant amount of variance in models 2 through 5. In addition, we found that one of the variables we measured as a proxy for market integration, frequency of wage labor in the past month, accounts for a significant amount of variance when entered in addition to the other variables in model 1 (see model 7). A one-standard-deviation increase in frequency of wage labor increased offers by approximately 50 percent. Wage labor is negatively correlated with household wealth (Pearson R-squared = −0.482, $p = 0.027$). In a final model, model 8, we entered only household wealth and wage labor as variables and found that the wage labor variable accounts for a significant amount of variance, while household wealth does not. In this model, again, a one-standard-deviation increase in frequency of labor boosts contributions by about 50 percent.[1]

FIGURE 10.2 *Player 1 Offer Amounts in the Dictator Game, Ultimatum Game, and Third-Party Punishment Game*



Source: Authors' compilation based on author data.

The mean ultimatum game offer was 36.67 percent (standard deviation = 16.53) of the stake, with a prominent mode at 50 percent (see figure 10.2). UG offers were not significantly higher than DG offers (Wilcoxon test, z = 0.287, p = 0.774). Player 2s expressed relatively low levels of stated propensity to reject low offers. Most subjects indicated that they would be willing to accept offers of zero. Thirty percent of player 2s (six of twenty) indicated that they would reject an offer of zero (see figure 10.3).

Possible effects of our six target variables were examined using regression in the manner reported earlier. Results of the regression are shown in table 10.2. Of the six variables examined, only household size had a significant, positive, impact on UG offers (in models 2, 5, and 6). This was a positive effect, with one standard deviation in household size increasing offers by 35 to 50 percent, depending on the model.[2] Because wage labor had a significant impact on offers in the DG, in some models we looked for effects of this variable on UG offers using regression analysis, but found

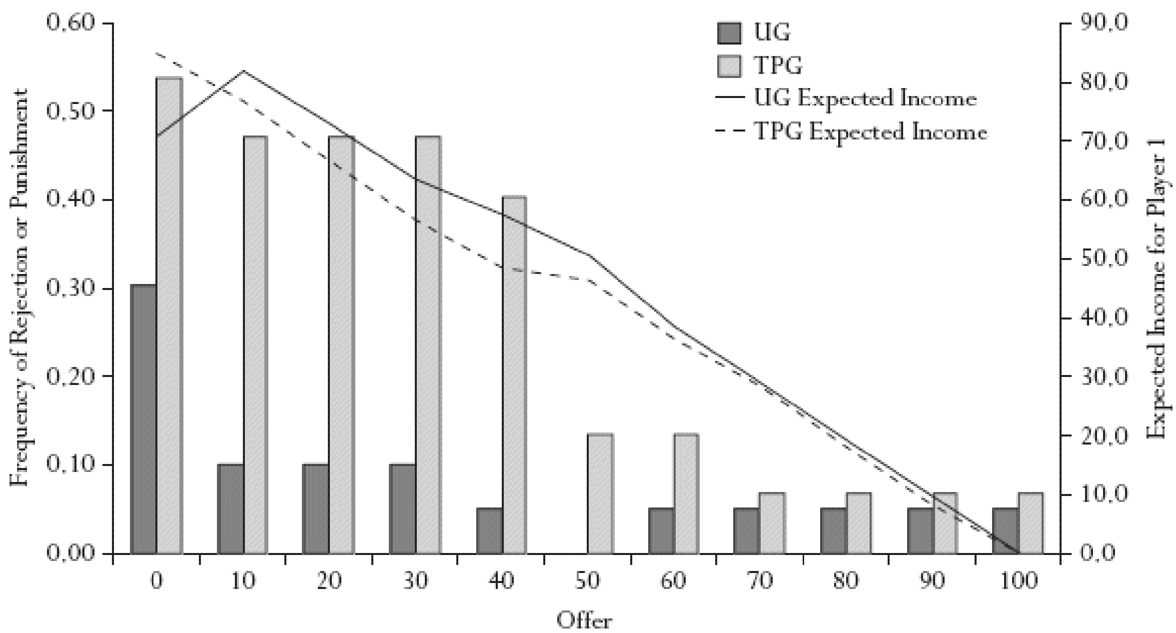
none, so these analyses are not reported here. Finally, to examine the question of consistency in player offers across games we computed the correlation between DG offers and UG offers within players, but found no significant correlation (Pearson R-squared=0.169, *p*=0.465).

TABLE 10.1 *Linear Regressions of Shuar Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	−.365						−.341	
	(.342)						(.316)	
Female	−.714	−.587					−.307	
	(.501)	(.489)					(.511)	
Education	−.334	−.0154	.0362				−.391	
	(.384)	(.244)	(.243)				(.356)	
Individual income	.117	−.0169	.0501	.0659			.110	
	(.277)	(.248)	(.245)	(.214)			(.255)	
Household wealth	−.531*	−.474	−.338	−.335	−.347		−.281	−.154
	(.286)	(.283)	(.262)	(.254)	(.245)		(.296)	(.200)
Household size	.230	.0405	−.102	−.0941	−.0988	−.292	.287	
	(.337)	(.288)	(.265)	(.252)	(.245)	(.209)	(.312)	
Frequency of wage labor in previous month							.524*	.532**
							(.281)	(.207)
Constant	3.523***	2.529***	2.297***	2.333***	2.419***	2.524***	2.761**	1.735***
	(1.18)	(.730)	(.713)	(.652)	(.573)	(.583)	(1.162)	(.326)
Observations	21	21	21	21	21	21	21	21
Model significance	0.421	0.422	0.470	0.303	0.161	0.179	0.224	.011
Adjusted R-squared	0.023	0.014	−0.014	0.045	0.093	0.045	.170	.339

Source: Authors' compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

FIGURE 10.3 *Frequency of Rejections or Punishment in the Ultimatum Game and the Third-Party Punishment Game*



Source: Authors' compilation based on author data.

Another variable of interest in the ultimatum game is the minimal acceptable offer (MinAO): the smallest offer that was not rejected by player 2. We computed MinAOs for the UG and performed the standard series of regressions described earlier. Results are shown in table 10.3. Here the only variable that had a significant impact on UG MinAOs was household wealth, in models 3 and 5. However, scatter-plot analysis revealed that this effect was being driven by two individuals who expressed minimal acceptable offers of 40 and 50 percent of the stake, respectively, and both of whom were greater than half a standard deviation above the mean wealth. We removed these two individuals from the analysis and ran model 5 again. The result, reported in table 10.3 as model 7, shows that the effect of household wealth on UG MinAOs disappears when these two individuals are removed.

Finally, we analyzed data from the third-party punishment game. Because of an error in subject assignment, we had to throw out data for three subjects in the TPG. Analyzing data for forty-five subjects, we found that, as in the UG, offers were generally higher in the TPG, with a mean of 37.93 percent (standard deviation = 17.92) of the stake, with modal offers at both 40 percent and 50 percent (see figure 10.2). Levels of stated willingness to

punish were moderate. Approximately half of the player 3s indicated that they would pay to punish offers of 0, 10, or 20 percent, with this willingness abating for higher offers up to 50 percent of the stake (see figure 10.3).

Using the same method as before, we performed a series of linear regressions on TPG offers. The results are shown in table 10.4. As before, the overall level of variance in offers explained by the models was low, and none of the six independent variables had a significant effect on offers. As we did with the MinAO in the UG, we computed the lowest acceptable offer not punished in the TPG. The results are shown in table 10.5. No significant effects of any of the six variables on lowest unpunished offers were found. Of the fifteen offers made by player 1s, five were punished (33.3 percent).

TABLE 10.2 *Linear Regressions of Shuar Ultimatum Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	.159					
	(.297)					
Female	−.350	−.406				
	(.435)	(.412)				
Education	−.0189	−.158	−.122			
	(.334)	(.206)	(.202)			
Individual income	−.147	−.0887	−.0423	−.0952		
	(.240)	(.209)	(.203)	(.180)		
Household wealth	−.0288	−.0536	.0405	.0321	.0481	
	(.249)	(.238)	(.049)	(.213)	(.207)	
Household size	.396	.478*	.380	.352	.359*	.386**
	(.292)	(.242)	(.459)	(.212)	(.207)	(.168)
Constant	.813	1.246*	1.085*	.965*	.840*	.825*
	(1.025)	(.730)	(.593)	(.547)	(.484)	(.468)
Observations	21	21	21	21	21	21
Model significance	0.437	0.332	0.300	0.200	0.106	.033
Adjusted R-squared	0.014	0.061	0.063	0.098	0.134	0.177

Source: Authors' compilation based on author data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

TABLE 10.3 *Linear Regressions of Shuar Ultimatum Game Minimal Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	1.501						
	(3.734)						
Female	−0.257	−0.632					
	(8.544)	(8.234)					
Education	2.690	1.805	1.934				
	(4.741)	(4.071)	(3.581)				
Individual income	2.954	3.410	3.482	3.935			
	(3.860)	(3.577)	(3.336)	(3.157)			
Household wealth	6.558	6.569	6.474*	7.092*	7.632**		−0.390
	(4.121)	(3.995)	(3.672)	(3.411)	(3.439)		(1.155)
Household size	−6.099	−5.964	−5.966	−5.657	−4.513	−0.662	1.212
	(3.891)	(3.759)	(3.632)	(3.506)	(3.439)	(3.277)	(1.054)
Constant	3.728	8.598	8.283	9.726	9.088	7.667	−1.262
	(15.742)	(9.744)	(8.537)	(7.926)	(8.037)	(8.843)	(2.565)
Observations	20	20	20	20	20	20	20
Model significance	0.462	0.338	0.209	0.124	0.113	0.842	0.489
Adjusted R-squared	0.002	0.062	0.124	0.163	0.135	−0.053	−0.030

Source: Authors' compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation).
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

TABLE 10.4 *Linear Regressions of Shuar Third-Party Punishment Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−0.108					
	(0.418)					
Female dummy (not divided by standard deviation)	1.057	1.101				
	(0.727)	(0.669)				
Education	0.148	0.243	0.145			
	(0.455)	(0.256)	(0.269)			
Individual income (in U.S. dollars)	0.365	0.349	0.241	0.278		
	(0.273)	(0.252)	(0.263)	(0.245)		
Household wealth (in U.S. dollars)	0.573	0.591	0.206	0.228	0.217	
	(0.391)	(0.364)	(0.302)	(0.289)	(0.292)	
Household size	−0.253	−0.311	0.117	0.146	0.107	0.226
	(0.462)	(0.384)	(0.306)	(0.291)	(0.292)	(0.240)
Constant	0.764	0.484	0.828	0.959	1.369**	1.346**
	(1.339)	(0.741)	(0.769)	(0.706)	(0.613)	(0.602)
Observations	15	15	15	15	15	15
Model significance	0.532	0.379	0.604	0.469	0.516	0.365
Adjusted R-squared	−0.039	0.068	−0.091	−0.020	−0.045	−0.009

Source: Authors' compilation based on author data.

Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

TABLE 10.5 *Linear Regressions of Shuar Lowest Unpunished Offers in the Third-Party Punishment Game*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−1.583					
	(1.518)					
Female dummy (not divided by standard deviation)	1.253	3.163				
	(2.742)	(2.051)				
Education	−1.514	−0.362	−0.260			
	(1.614)	(1.182)	(1.259)			
Individual income (in U.S. dollars)	2.089	1.917	1.258	1.090		
	(1.361)	(1.358)	(1.375)	(1.056)		
Household wealth (in U.S. dollars)	−0.543	−0.788	−1.209	−1.257	−0.934	
	(1.043)	(1.021)	(1.050)	(0.978)	(0.929)	
Household size	0.857	1.467	0.796	0.741	0.187	−0.0355
	(1.298)	(1.164)	(1.152)	(1.071)	(0.929)	(0.903)
Constant	3.562	−5.576	−0.255	−0.256	2.757	2.971
	(10.737)	(6.237)	(5.542)	(5.296)	(4.429)	(4.425)
Observations	15	15	15	15	15	15
Model significance	0.509	0.511	0.746	0.575	0.615	0.969
Adjusted R-squared	−0.020	−0.030	−0.172	−0.070	−0.076	−0.077

Source: Authors' compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are rescaled (divided by standard deviation).

Because few fresh subjects were available to play the TPG, we made role assignments as follows. All eight fresh players were assigned to the role of player 3. For the remainder, we attempted to keep each player in the same role across games. Thus, fifteen players were player 1 in all three games, and fifteen were player 2 in all three games. However, to balance the players for the TPG we had to shift roles for seven players. Four people took the role of player 1 in the DG and UG, then shifted to player 3 in the TPG. Three people were player 2 in the first two games and shifted to player 3 for the TPG. Data from three players had to be discarded because partners could not be found.

For repeat players, was there consistency, or patterned inconsistency, between their play in the TPG and earlier games? For repeat player 1s, there was no significant correlation between offers in the TPG and the DG (Pearson R-squared = 0.045, p = 0.873), nor between offers in the TPG and the UG, though TPG and UG offers were closer to significant positive correlation (Pearson R-squared = 0.404, p = 0.135). There was no significant difference in overall level of offers between the UG and TPG, the DG and

TPG, or the DG and UG (Wilcoxon signed rank test). In general, we could find no significant patterned relationship in play by the same players across games.

DISCUSSION AND CONCLUSIONS

Compared to other societies examined in this volume and elsewhere, the Shuar fall within the normal range of economic game behavior in certain ways, but they are also unusual in some regards. Using the UG as a benchmark, we see that the Shuar are certainly less generous in their offers than university students in a variety of countries; UG offers for the latter range between 42 and 48 percent (Henrich et al. 2004). However, when compared to a previous cross-cultural study of UG behavior (Henrich et al. 2004), the mean of Shuar offers in the UG, at 37 percent, is within the range of observed mean offers of a diverse set of fifteen cultures, which ranged from 25 to 57 percent of the initial stake. (Interestingly, the Shuar mean UG offer of 37 percent found here was somewhat lower than the 43 percent found for the Achuar, a culturally similar group, by Patton [2004].) On the other hand, the Shuar appear to have a low rejection rate in the UG, when compared to other populations: among the societies studied in this volume, they were tied for the lowest rejection rate in the UG with Fijians and the Tsimane'. This does not indicate, however, that the Shuar are never punitive: their TPG punishment rates were relatively high compared to these populations.

For the DG, the Shuar mean offers, at 35 percent (with modes at 20 and 50 percent), were between those seen for other populations. For example, the Shuar were more generous in their offers than university students, who showed a mean at 25 percent and a mode at zero, and less generous than the rural U.S. population of adults in Missouri (chapter 18, this volume, available at: http://www.russellsage.org/Ensminger), who show a mean offer of 47 percent, with a mode at 50 percent. As far as offers go, the Shuar do not appear to be on either end of the distribution of low to high offers seen in other cultures, though they may tend toward the less generous end. With regard to rejecting offers in the UG, the Shuar are relatively tolerant, but less so as third-party punishers.

The DG can be particularly revealing of economic preferences because other players have no chance to respond. As in some other populations, we

observe two distinct modes in the DG: one fair, and another more consistent with money-maximization (though still significantly above zero). We speculate that this bimodal distribution, which is apparent in various games in other populations (Camerer and Fehr 2004; Ensminger 2004; Ruffle 1998), reflects the presence of distinct strategies, or game framing effects, among the players. There are several possible explanations for these distinct playing styles: (1) differences in understanding of the money at play in the game, with some subjects interpreting it as a public windfall (leading to a sharing expectation) and others interpreting it as a private gift (leading to a private property interpretation); (2) differing degrees of responsiveness to the anonymity of the games; (3) differing degrees of adherence to norms of fairness; (4) differences in motivation to engage in reciprocity interactions (and perhaps differing degrees of awareness that no positive or negative reciprocity would be possible in the DG); and (5) other possible differences in motivation or interpretation of the games. (One subject, for example, knowing this was an international study comparing cultures, reported a desire for the Shuar to appear generous.)

Higher offers in the DG came mainly from individuals who engaged more frequently in wage labor (table 10.1, models 7 and 8), a variable negatively related to individual and household wealth. Although in the DG higher offers came from less wealthy people who did more wage labor, in the UG we found that wealthier people required higher offers to accept the split proposed by player 1 (table 10.3, models 3 to 5). In other words, wealthier people gave less in the dictator game and expected more in the ultimatum game. This is one of the few patterns we found that held across more than one game.

Among the Orma of East Africa, Jean Ensminger (2004) found a similar effect of wage labor on offers in the UG, in the same direction: individuals engaging in wage labor offered significantly higher fractions of the initial stake when in the position of player 1. Ensminger notes that these results are consistent with the overall findings of the fifteen-society study by Joseph Henrich and his colleagues (2004), in which greater “fairness” was associated with increasing degrees of market integration. Ensminger (2004, 380) suggests that “among those selling either their labor or their goods, there may be a higher premium placed upon reputation, and…one way of signaling a good reputation is to behave fair-mindedly.” We agree, though

we would suggest that subjects also seek to generate, rather than merely signal, a good reputation through such behavior.

In the context of Shuar living in Chinimpi, it might be that individuals who engage frequently in wage labor—who are poorer—have a greater motivation to initiate and maintain profitable reciprocity relationships such as contractual labor exchange interactions. They may more readily import a schema of reciprocal economic exchange into the game setting, causing them to make higher offers. In the same way that some players among the Au and Gnau of New Guinea make hyper-fair offers consistent with the social practice of incurring social credit through competitive gift-giving (Tracer 2004), less wealthy wage laborers may behave as individuals attempting to initiate reciprocal exchange relationships and to establish an initial reputation for generosity and goodwill. This is consistent with the UG MinAO data suggesting that they have more forgiving thresholds for the termination of exchange. However, this is speculative and awaits confirmation in further work.

Although we find that the decisionmaking exhibited by our Shuar population exhibited a pattern that differed from that of any of the other societies studied here—yet also was not out of the bounds of the observed variation—it remains to be seen what combination of factors best explains Shuar decisionmaking in these games. We feel that the impact on individual play of players' interpretations of the stylized situations presented by behavioral economic games is an important area for future research. Of particular interest is the question of how money, which is evolutionarily novel for all people and culturally novel for many, interacts with preexisting cultural norms and intuitive inference systems in populations that have little experience with it.

We would like to express our deep thanks to the people of Chinimpi and nearby communities for their participation in this study and for their generosity and hospitality during our stay.

NOTES

1. As a robusticity check, we generated scatter plots of both wage labor and household wealth against DG offers and found that these effects are not driven by outliers. Additionally, separate

correlation analyses showed significant correlations between wage labor and DG offers (Pearson R-squared = 0.614, p = 0.003) and between household wealth and DG offers (Pearson R-squared = −0.420, p = 0.058).

2. As a robusticity check, we plotted household size against UG offers to confirm that there was a positive relationship between the two variables that was not driven by outliers. Household size and UG offer were significantly correlated (Pearson R-squared = 0.467, p = 0.033).

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Chapter 11

Economic Experimental Game Results from the Sursurunga of New Ireland, Papua New Guinea

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In July and August 2003, I conducted the dictator game (DG) and the strategy method ultimatum game (UG) experimental protocols, using cash, among Sursurunga speakers of New Ireland Province, Papua New Guinea. Two years later, I carried out the third-party punishment game (TPG) in the same area.[1] These games were completed using the protocols described in chapter 3.[2] This chapter begins with an overview of the Sursurunga before moving on to the results of these three games. A discussion follows in which I consider some of the implications of these results, including the ways in which Sursurunga psychological distress at perceived unfairness serves as a salient motivator for decisions made in the games.

ETHNOGRAPHIC OVERVIEW

There are about four thousand people who speak Sursurunga (an Austronesian language); they live toward the southern end of the island of New Ireland, Papua New Guinea. Most of these four thousand live in a string of nineteen nucleated villages along the east coast and in its immediate hinterlands.[3] Toward the middle of these nineteen villages is Tekedan, a village that is home to 157 people and that serves as my research base as well as one of the primary research sites.[4] About forty minutes away on foot is Nokon Village, with a population of 201. Most of the subjects for the three games resided in either Tekedan or Nokon.

The Sursurunga organize themselves on the basis of named matrilineal clans and unnamed matrilineages. Marriage is governed by a prescriptive rule of matrimoiety exogamy. As an outcome of new residential patterns that emerged in the aftermath of World War II and with a greater Australian colonial presence, named nucleated villages sprung up along the coast. Each

village has a matriclan that is most prominent, such that there is a very rough one clan–one village association. There are many villages, however, that have more connections with certain other villages via enatic ties (through the mother's side) as well as through marriage. Tekedan, Nokon, and Himaul (which is between Tekedan and Nokon) are three such villages in that the number of people who visit back and forth—for various reasons (not the least of which is physical proximity)—between these three is not insignificant.

Matrilineal descent is also the template that guides the system of mortuary feasts conducted in honor of the dead. In brief, when a person dies, the opposite matrimoiety provides gifts to the family of the deceased and performs a number of the responsibilities associated with burial. Later (sometimes months, sometimes years, depending on a number of variables), a subsequent feast is sponsored by the lineage of the deceased—with strong clan and some matrimoiety support—in which the gifts and services given at the burial are reciprocated. At these feasts, much pork is consumed, and outside of the occasional hunter bringing home a boar from the forest, pork is almost never consumed except in mortuary circumstances (which would also include smaller-scale feasts such as when the belongings of the deceased are burned or when the cemetery is cleaned and weeded).[5]

TABLE 11.1 *Reduction in Wage Labor in New Ireland Province, 1990 to 2000*

Year	Total Rural Population	Engaged in Non-monetary-Sector Activities	Money-Sector Activities	Not Stated
1990	54,635	32,808 (60.0%)	21,573 (39.5%)	252 (0.5%)
2000	73,433	60,207 (82.0%)	11,824 (16.1%)	1,402 (1.9%)

Source: Author's compilation based on Papua New Guinea national censuses (National Statistics Office 1994, 2002).

Most of the everyday diet is locally grown in swidden gardens and consists of sweet potato (varieties of *Ipomoea batatas*), manioc (*Manihot esculenta*), yams (*Dioscorea esculenta*), and taro (*Colocasia esculenta*) cooked with greens in a potage made of the cream of shredded coconut meat. Bananas and other fruits supplement the diet, along with occasional portions of fish or shellfish. Around one-quarter of the calories consumed locally come from purchased foods, by far the most common being rice.

The Boluminski Highway (the official name of the east coast road) bisects most of the nineteen Sursurunga villages on the east coast.

Irregularities in the repairs made to bridges and roads in the past decade or so have made passage north to the district capital, the small town of Namatanai (2010 population: 1,376), about seventy kilometers away from Tekedan, a bit more uncomfortable and time-consuming. Many people travel to Namatanai several times a year. (A round trip from Tekedan costs eight to ten Papua New Guinea kina [about U.S.$3.20 to U.S.$4.00], depending on the vehicle.)

Namatanai serves as the source of many things for the Sursurunga area, some of the more locally important being newspapers, motor fuel, alcohol, clothing, manufactured items such as tools and cooking pots, and food.[6] Although Namatanai became harder to reach during the recent global economic downturn, the availability of items for purchase had already been limited by the longtime stagnation (or worse) of the cash economy in the area. Nowadays, Namatanai merchants have meters of empty shelving in the same spaces where they were full of Australian and Chinese imports in the early 1990s. The single biggest reason for this economic stagnation has been the devaluation of the kina, the national currency. In 1992 the kina was worth approximately U.S.$1.05; today a kina, which first began to float in 1994, fluctuates between U.S.$0.35 and U.S.$0.40. The decrease in the value of the kina has resulted in a significant provincewide move away from wage work and cash-cropping to subsistence farming, as the numbers in tables 11.1 and 11.2 show. This is even more true south of Namatanai (that is, in the part of New Ireland inhabited by Sursurunga speakers), where the Boluminski Highway is in chronic disrepair. In short, while travel to Namatanai has contributed to the town's growth as a regional center in many ways, people's economic reliance on the services available in Namatanai has decreased since the mid-1990s (see table 11.1). Perhaps the most striking evidence of this decrease is that there are far fewer items available for purchase at Namatanai (where I typically purchase supplies)—both in absolute terms (the empty shelf space mentioned earlier) and in terms of variety. For example, only one brand of rice, tinned beef, and tinned fish is to be found nowadays, whereas there were choices of up to four brands of each in the early 1990s.

TABLE 11.2 *Household Economic Activity in Northern and Southern New Ireland Province, 2010*

District	Total Rural Population	Δ Percentage Engaged in Food Crops	Δ Percentage Engaged in Coconuts	Δ Percentage Engaged in Betel Nuts	Δ Percentage Engaged in Fishing
Kavieng	38,931	59.7%	12.1%	30.0%	36.7%
Namatanai	63,553	65.4	19.7	49.3	46.0

Source: Author's compilation based on Papua New Guinea National Research Institute (2010, 174–175).
Note: Δ = difference between households engaged in the activity minus those engaged in the activity for cash.

Information from the 2010 Papua New Guinea national census (conducted in 2011) is not yet available for the number of people engaged in non-money-sector activities and money-sector activities. However, the Papua New Guinea National Research Institute (NRI) released data in March 2010 showing that the trend away from a reliance on the cash economy (table 11.2) is more pronounced in the southern Namatanai District (where the Sursurunga are) than in northern New Ireland. The NRI figures do not distinguish between rural and urban households, but the only towns on New Ireland are the provincial capital Kavieng in the north and Namatanai in the south. The total rural population figures reported in table 11.2 are the difference between the entire district population and the populations of those two towns.

The figures in table 11.2 show that Namatanai District households consistently differ from their northern New Ireland counterparts in how much less they engage in cash-based economic activity. The conclusion that can be drawn from the two tables presented here is that, for at least a generation, the degree of integration into the broader cash economy has remained steady in the Sursurunga area.

SURSURUNGA SOCIALITY

One of the most striking aspects of Sursurunga society is the cultural emphasis on what is called "balanced reciprocity" (Sahlins 1965), which is very much a kind of "equality matching" relational template, as described by the psychological anthropologist Alan Fiske in *The Structures of Social Life* (1991; see also Fiske 1992, 2002). Fiske's insightful distillation of much twentieth-century behavioral science thinking addresses the nature of human relationships and argues for the existence of four elementary, innate

templates of human social relations: communal sharing (CS), authority ranking (AR), equality matching (EM), and market pricing (MP). Each of these templates entails particular built-in assumptions about other people, such as:

> *Communal sharing:* Everyone in the group is to be treated well, and those not in the group are not to be treated well. In terms of reciprocity, intragroup exchange is ordered by an ethic of as-needed assistance.

> *Authority ranking:* Everyone in the group has a place, there is a pecking order, and one can identify those above and those below in that order. Exchange is an important marker of that order: those who are higher demonstrate their rightful place—or make claims to higher places—by out-giving those below.

> *Equality matching:* Everyone in the group is the same and should have the same rights and obligations. Balanced reciprocity guides exchange: relationships are best maintained by the orderly maintenance of equitable trade. In this pattern, giving too little demonstrates meanness and stinginess, while giving too much is an aggressive act that is seen to be an effort to demean the recipient.

> *Market pricing:* Everyone in the group is expected to be a net asset, rather than a net liability, to the group; membership in the group is contingent on giving more than one takes. Exchange is based on the related notions of profit and return. Zero-sum exchanges are avoided within the group, but not outside the group.

Fiske notes that these templates rarely exist in unalloyed form, but that in general one or two can be seen to be dominant in any particular social order. More to the point, these templates are constituents of socio-moral emotions that guide people "toward behavior that will tend to create or restore optimal relational equilibrium" (Fiske 2002, 172). In other words, people can *feel* when the culturally salient templates vary from perceived reality. Among the Sursurunga, the stress on "equal sharing" easily calls to mind EM as the prevailing relationship template or schema, as exemplified in the following examples.

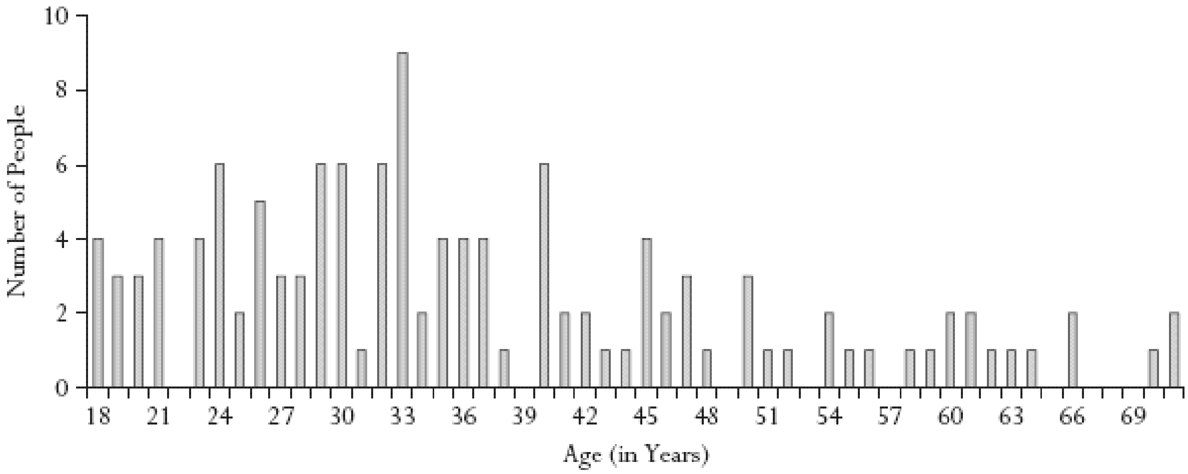
> *Example 1: Repaying pork*. At a feast where pork is consumed, it is not uncommon for there to be a repayment for a gift of pork provided in the past. When a feast sponsor wishes to repay his debt to another, he retrieves the measuring device—the ribs of palm fronds work well for this—that was used to gauge the original gift. He then sees to it that a piece of pork of precisely the same size is cut so that he can reciprocate the original gift exactly. I should note that when pressed, people explain their behavior by noting that a return gift of lesser size makes one appear to be mean, while a return gift larger than the original makes the other person uncomfortable (bál i sák, or, "the belly is bad").[7]

> *Example 2: Compensation*. Among the Sursurunga, no bad deed goes unpunished—at least in principle. I have witnessed discussions during local village moots (warkurai) over the appropriate cash compensation to be paid for the following transgressions: name-calling; breaking and entering; shooting slingshots in populated areas; adultery; one person's pig breaking into another person's garden; contaminating the water supply; one person's dog killing another person's chicken; and fighting. These are some of the more frequent offenses. That compensation should be rendered in such instances is without question; the issue that consumes hours of discussion for each act of malfeasance is the amount of the appropriate compensation, since, people say, too little leaves the victim with residual bad feelings and too much leaves the perpetrator with a grudge.

> *Example 3: Record-keeping*. When a person dies, the women from surrounding villages pay their respects by coming to keen and wail at the men's house belonging to the matrilineage of the deceased. Each woman's name is recorded so that at a subsequent feast—which can sometimes take place several years later—she will be compensated for her effort with a packet of pork and other victuals. The painstaking care involved in the recording process, as well as the concern for preserving the record itself, stands out in a place where people seem to care less for and lose track of other documents, such as bank passbooks, health/immunization records, and business agreements.

I should note that the salience of EM among the Sursurunga appears to be consistent with a pan-Melanesian phenomenon (Fiske 1992, 704), even though the salience of EM will not manifest in the same ways across Melanesia. I have in mind as one contrasting case the well-known moka exchange system found in the Central Highlands of New Guinea (Strathern 1971). In moka, exchanges alternate over the years in increasing increments until one party is unable to keep up and “loses.” While moka may seem to run counter to EM, in fact it operates on the basis of EM. The intentional violation of a (salient) EM template for social relations that characterizes moka is the basis for the motivation to maintain the institution as each group attempts to keep from being “one-upped.”

FIGURE 11.1 *Sursurunga Sample: Age*



Source: Author's compilation based on author data.

Fiske notes that, given the subjective sense of the "naturalness" of these templates, behaviors that conform to them or are in accord with them are to a degree their own reward (Fiske 1991, 384–87; Fiske 1992, 716; Fiske 2002)—that is, they *feel* right, which means that not behaving in a particular way, such as along the lines of EM among the Sursurunga, is aversive. The experimental games that were played, being stripped of contextual cues such as indications of another player's kinship status and prestige, provided clear opportunities for default behavioral templates such as EM to be engaged. And in the Sursurunga case, EM is precisely what we see consistently manifested.

SURSURUNGA DEMOGRAPHICS

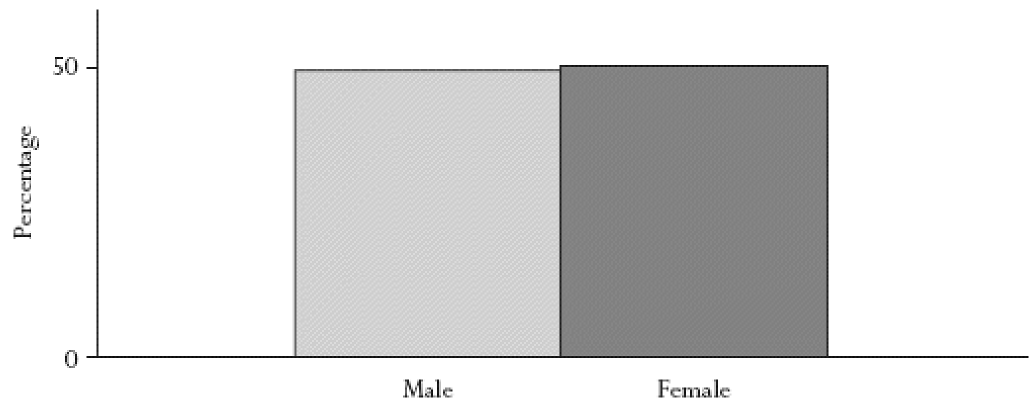
This comparative aspect of the Roots of Human Sociality Project relies on six key variables: age, sex, education, cash income, household wealth, and household size. The following histograms in figures 11.1 through 11.6 represent the Sursurunga game-playing population (N = 125) along these dimensions.[8]

The ages of the people in the Sursurunga sample are unremarkable. The mean age of all participants was 36.7 years (standard deviation = 13.4 years), and the median age was 33.0 years.

The sex ratio for the three games (that is, the DG, UG, and TPG) was virtually even, with females representing 50.4 percent of the sample.

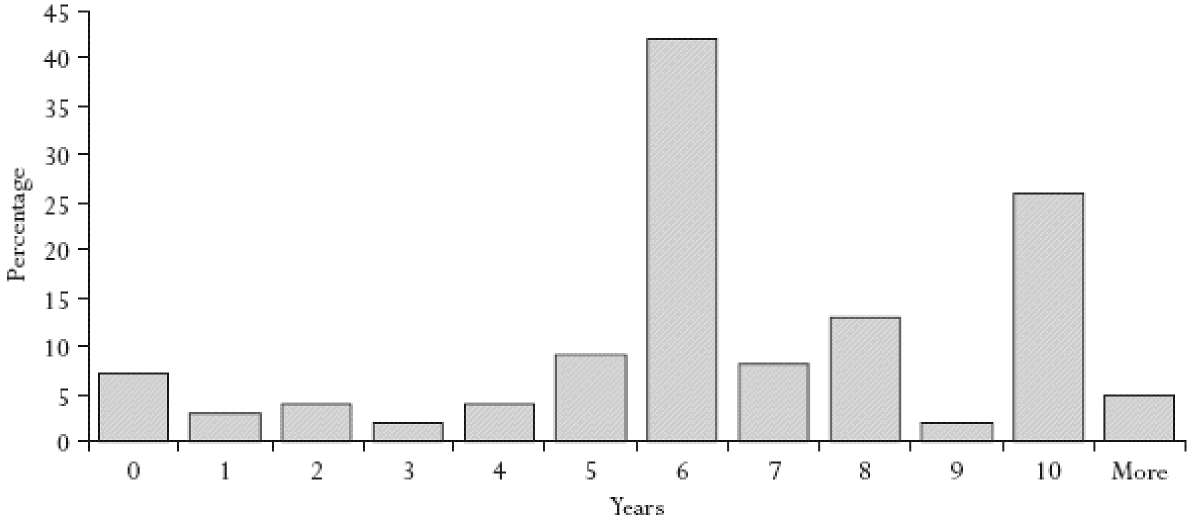
The spike at six years of education that can be seen in figure 11.3 reflects the national pattern of testing. After completing grade 6, children sit for an exam that makes them eligible for additional schooling. Between too-low test scores and the increase in cost for education beyond grade 6, education for many people ends after six years. A similar test occurs at the completion of grade 10, which accounts for a similar, although smaller, spike.

FIGURE 11.2 *Sursurunga Sample: Sex*



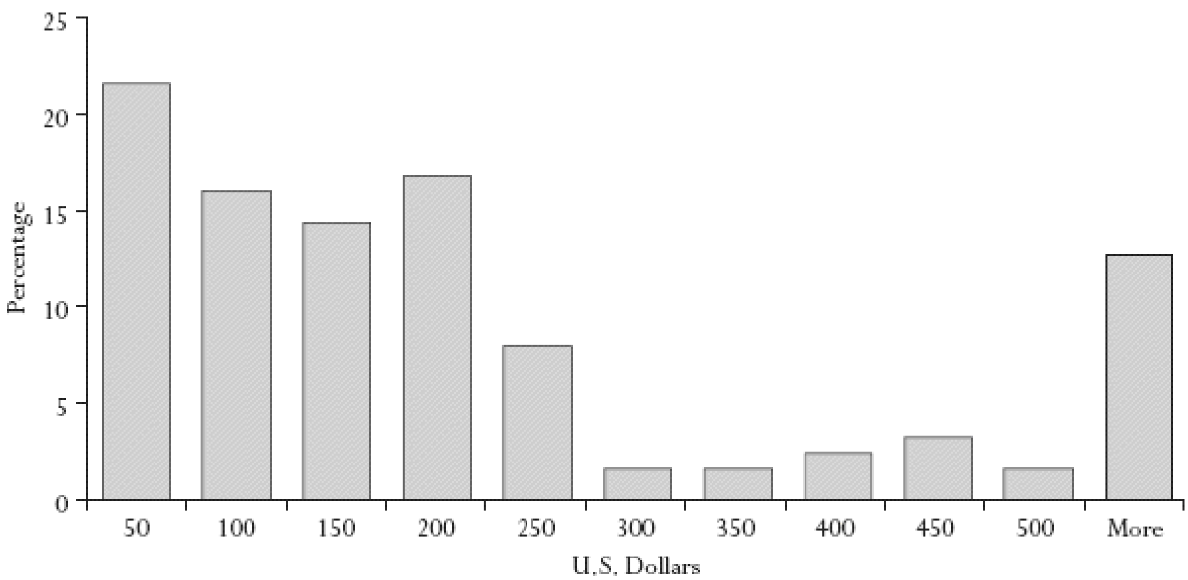
Source: Author's compilation based on author data.

FIGURE 11.3 *Sursurunga Sample: Education*



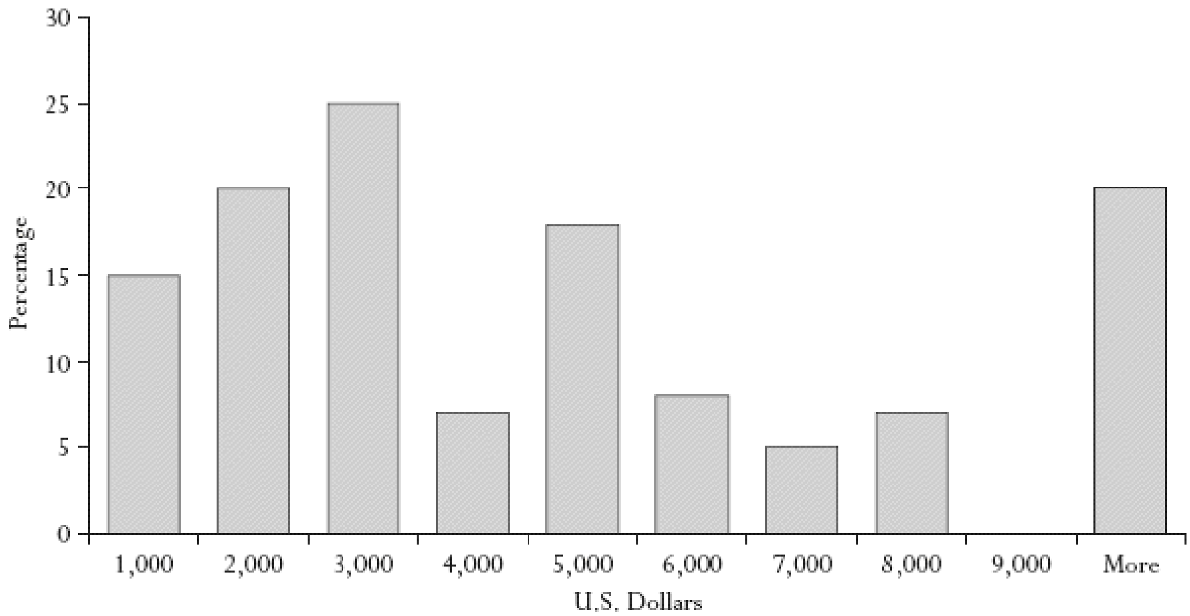
Source: Author's compilation based on author data.

FIGURE 11.4 *Sursurunga Sample: Annual Income*



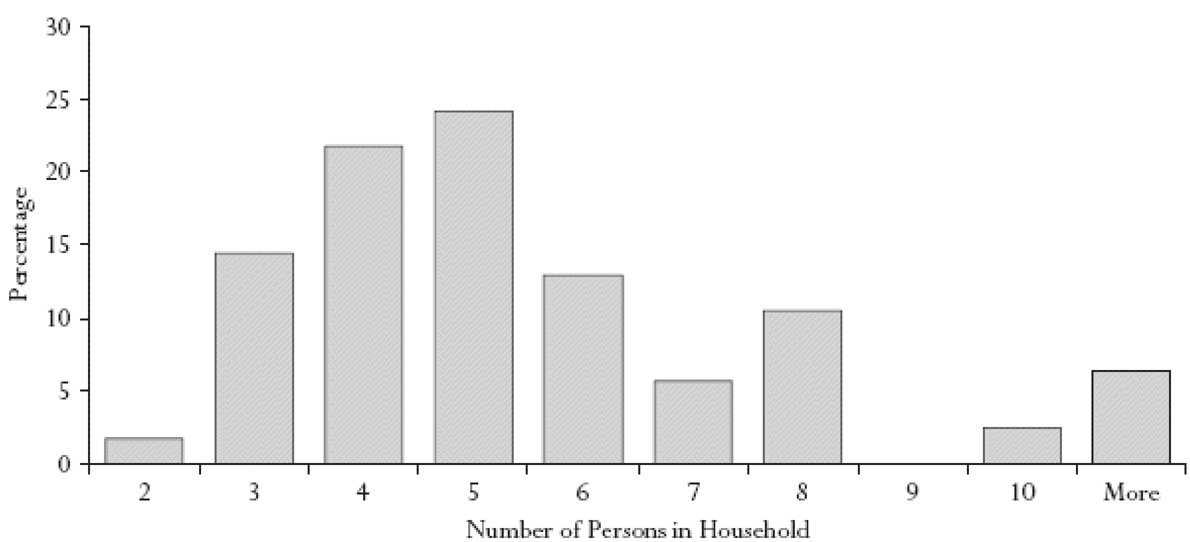
Source: Author's compilation based on author data.

FIGURE 11.5 *Sursurunga Sample: Household Wealth*



Source: Author's compilation based on author data.

FIGURE 11.6 *Sursurunga Sample: Household Size*



Source: Author's compilation based on author data.

Like household wealth, there is great range when it comes to annual cash income in the Sursurunga sample. Most people do a bit of cash-cropping, a smaller number of people do a bit of selling at roadside stands, and wage

labor is a distant third when it comes to the means by which people make money. The mean per capita income for the sample is U.S.$276 (standard deviation = 477), and the median is U.S.$136. Not surprisingly, the correlation between household wealth and per capita income is r = 0.31067, which is significant at the 0.01 level.

The mean figure for household wealth is U.S.$5,024. There is a standard deviation, however, of $5,666. The median is $3,445. What we find, then, is a tremendous amount of variability in terms of household wealth in the Sursurunga area.

The mean household size for those playing the DG, UG, and TPG was 5.5 (standard deviation = 2.3); the median size was five persons. It is significant that no one lived alone—that is, there are no Sursurunga households of one person.

MARKET INTEGRATION AND WORLD RELIGION

The variables market integration (MI) and world religion (WR) have already been discussed (chapters 2 and 4) as being significant factors in the data, and conclusions are presented in this volume. Therefore, I describe them in a bit more detail here.

As noted in chapter 3 (table 3.1), the Sursurunga MI score is 24, which signifies that a mean of 24 percent of people's daily caloric intake (mostly in the form of rice) is purchased. As has been true for much of Papua New Guinea (Gibson 2001), rice consumption seems not to have increased much in the past two decades, so the MI score is not an aberration. The remaining calories come mostly from tubers and coconut. Protein sources include various forms of greens, fish, and, on occasion, pork.

Rice is usually purchased in small (one kilogram for around 3.25 kina, or approximately U.S.$1.25) plastic bags from a local trade store. Two trade stores can be found at Tekedan Village most of the time. I say “most of the time” because a proprietor may be absent from the village for a few weeks or months (perhaps taking advantage of a wage labor opportunity), or because he is out of stock and cash and so shuts down temporarily. Nokon Village has four such stores, and Himaul has two—all subject to the same contingencies as the Tekedan stores. The sporadic hours of these stores contribute to the somewhat low MI level, and I am convinced (and many local people have said) that if rice was more available, more would be eaten.

The Sursurunga WR score is 1.0. Although it may seem impossible to someone from a large, industrialized, diverse society that there could be 100 percent agreement on religious beliefs, it is an accurate description of the religious reality among the Sursurunga.[9] I have no record of anyone in any of the communities studied ever disavowing Christian theism, even if church attendance and other measures of strength of belief might be low for some individuals.

Christian denominations in the area roughly match the proportions of the sample; that is, approximately 80 percent of the population claims adherence to the United Church, an alloy of London Missionary Society and Methodist churches that amalgamated throughout the region in 1968 (see Bolyanatz 2000, 25–28). The more recent arrivals, the Pentecostal and charismatic forms of Christianity, make up the remainder.

RESEARCH METHODS

The basic procedures for conducting DG, UG, and TPG have already been described in chapter 3. Here I describe the particular ways in which I used the basic procedures and the ways in which I modified or revised those procedures at the Sursurunga site.

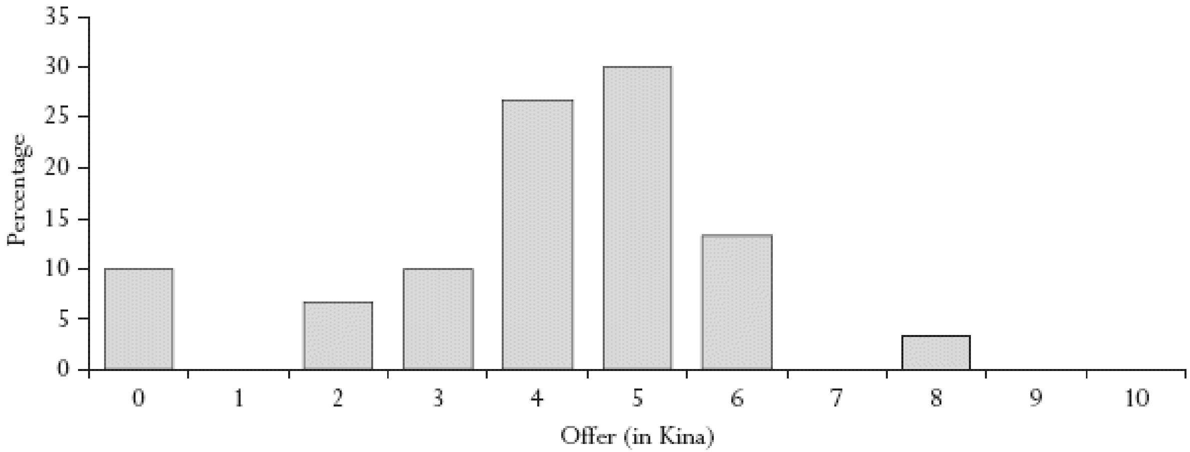
I carried out the DG and UG two years prior to the TPG. I was pessimistic about the logistics of playing all of the games on New Ireland and determined prior to arriving there in 2003 that I would attempt the TPG only if it seemed appropriate at the time. It did not. Conducting the TPG at a neighboring village (Nokon) two years later had the added advantage of reducing the chance of contamination.

The weather did not cooperate for the first half of the DG at Tekedan; constant heavy downpours made it difficult to keep people together and impossible to keep those who had finished playing separate from those who had yet to play, as shelter from the rain was a more important consideration to many people (reasonably enough) than my efforts to keep the two groups apart. Although this difficulty set up the possibility of contagion, two research assistants monitored the area carefully and reported at the end of the day that they had heard no conversations about the game. I believe that my strident insistence at the outset of the day on not discussing the games, along with the patrolling research assistants, precluded any contagion, collusion, or contamination.

The games were conducted in Tok Pisin (Neo-Melanesian), a language in which I am nearly fluent, rather than the local vernacular, Sursurunga.[10] I chose to use Tok Pisin rather than Sursurunga as the language of investigation for three reasons: (1) my Sursurunga skills are not as developed as my Tok Pisin skills; (2) everyone tested—indeed, virtually everyone in the region—was bilingual in Tok Pisin and the local language; and (3) not everyone who lived in Tekedan or Nokon Village was from the Sursurunga area, and those people spoke Tok Pisin but not Sursurunga (although they understood it).

For some people, the reiteration of examples became quite tedious in all of the games; I reduced the number of examples for people who seemed both to understand fully and to become exasperated with the repetition. Thus, after the group presentation, I asked people if they had any questions when they entered the test area. After answering any questions, for each person I gave three examples, then moved to three tests, in which people were required to answer correctly. I then provided one more hypothetical example (a kind of "final exam") and asked the player what the outcome would be. If the person answered correctly, I believed that she or he had grasped the game, and I entered "1" on my data sheet in the "number of examples" column.[11] As expected, some people required additional examples, and I recorded the number of additional test examples given to each person. I would find that there was no statistically significant relationship between player 1 offers and the number of additional examples ($r = 0.0539$) across all three games, between player 2 minimum acceptable offers (MinAOs) and the number of additional examples ($r = -0.0847$) in the UG, and for player 3 in the TPG in terms of the highest amount offered by player 1 that went unpunished (0.0285). There is no evidence, then, that the revised amount of teaching had any effect on the outcome.

FIGURE 11.7 *Sursurunga Sample: Dictator Game Player 1 Offers*



Source: Author's compilation based on author data.

The protocols for these experiments call for the stake to be approximately one day's wage. For the cash games, I used 10 kina (1 kina equaled U.S.$ 0.26 at the time) as the stake. Ten kina is a rather good day's wage in the region, and though it is above the average daily wage (which would be between 4 and 8 kina), the ease of using ten 1-kina coins for the games outweighed other considerations. The same amount was also used in the other site in Papua New Guinea where the same experimental games were conducted (see chapter 7, this volume, available at: http://www.russellsage.org/Ensminger).

RESULTS

The Dictator Game

Figure 11.7 shows the results of the dictator game. The mean offer was 4.07 kina (or about 41 percent of the stake); the modal offer was 5 kina—a fifty-fifty split. As expected, given the salience of EM among the Sursurunga, this is not a remarkable result.

Table 11.3 shows the regressions of DG offers.[12] None of the other six variables under consideration (age, sex, education, income, household wealth, and household size) had a statistically significant effect on offers made by DG player 1s within the Sursurunga sample.

The most striking result is the pattern that emerges from players' postgame comments. Players were asked whether the activity in which they had participated was similar to any aspect of their customary life.[13] Many people gave different reasons for why the game did remind them of customary life, but for my purposes here, all usable answers are divided into two groups: the game did seem related to at least one aspect of customary life, or the game did not seem related to any aspect of customary life.[14] Table 11.12 contains the results.

TABLE 11.3 *Dictator Game Player 1 Offers*

Regression Statistics	
Multiple R	0.430911898
R-squared	0.185685064
Adjusted R-squared	−0.02674492
Standard error	1.880366735
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	6	18.54374836	3.090624727	0.874100072	0.528871761
Residual	23	81.32291831	3.535779057		
Total	29	99.86666667			

Variables

	Coefficients	Standard Error	*t*-Stat	*p*-Value	Lower 95 Percent	Upper 95 Percent
Intercept	4.452334427	1.479664029	3.009017142	0.006256418	1.39141619	7.513252664
Age	−0.223390243	0.382299096	−0.584333693	0.564683926	−1.014236173	0.567455687
Sex	−1.39900056	0.709206636	−1.972627567	0.060676599	−2.866106256	0.068105136
Education	0.270660022	0.534076271	0.506781592	0.617132303	−0.834160913	1.375480958
Income (U.S. dollars)	0.022697379	0.473512318	0.047934083	0.962182582	−0.956837476	1.002232234
Household wealth (U.S. dollars)	−0.138616782	0.403630439	−0.343424997	0.734398204	−0.973589957	0.696356392
Household size	0.173836672	0.400013205	0.434577334	0.667919291	−0.653653684	1.001327029

Source: Author's compilation based on author data.

TABLE 11.4 *Ultimatum Game Player 1 Offers and Six Demographic Variables*

Regression Statistics	
Multiple R	0.575068917
R-squared	0.330704259
Adjusted R-squared	0.15610537
Standard error	1.501421211
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	6	25.61855662	4.269759436	1.894079976	0.125074669
Residual	23	51.84811005	2.254265654		
Total	29	77.46666667			

Variables

	Coefficients	Standard Error	t-Stat	p-Value	Lower 95 Percent	Upper 95 Percent
Intercept	4.988548531	1.181471102	4.222319548	0.000323532	2.544489357	7.432607704
Age	0.149035433	0.305255332	0.488232038	0.630007854	−0.482433329	0.780504195
Sex	0.18234423	0.566282027	0.322002502	0.750359224	−0.989099388	1.353787848
Education	−0.107805106	0.426445239	−0.252799412	0.802668921	−0.989974289	0.774364078
Income (in U.S. dollars)	−0.362364918	0.378086586	−0.958417811	0.347819319	−1.144496606	0.41976677
Household Wealth (in U.S. dollars)	0.835092089	0.322287824	2.591137573	0.016330477	0.168388934	1.501795245
Household size	−0.365384382	0.319399562	−1.143972709	0.264401763	−1.026112712	0.295343949

Source: Author's compilation based on author data.

TABLE 11.5 *Ultimatum Game Player 1 Offers and Household Wealth*

Regression Statistics	
Multiple R	0.417638925
R-squared	0.174422271
Adjusted R-squared	0.144937353
Standard error	1.511323388
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	1	13.51191196	13.51191196	5.915643592	0.021653983
Residual	28	63.95475471	2.284098382		
Total	29	77.46666667			

Variables

	Coefficients	Standard Error	t-Stat	p-Value	Lower 95 Percent	Upper 95 Percent
Intercept	4.335304423	0.428709542	10.11245143	7.51506E-11	3.457132747	5.213476099
Household Wealth (in U.S. dollars)	0.682589187	0.280645708	2.432209611	0.021653983	0.107712523	1.257465851

Source: Author's compilation based on author data.

TABLE 11.6 *Ultimatum Game Player 1 Offers and Land*

Regression Statistics	
Multiple R	0.647338165
R-squared	0.4190467
Adjusted R-squared	0.376013123
Standard error	1.291059221
Observations	30

ANOVA

	df	SS	MS	F	Significance F
Regression	2	32.46215106	16.23107553	9.737668172	0.000654495
Residual	27	45.00451561	1.666833912		
Total	29	77.46666667			

Variables

	Coefficients	Standard Error	t-Stat	p-Value	Lower 95 Percent	Upper 95 Percent
Intercept	6.190532371	0.633036384	9.779109907	2.28775E-10	4.891649016	7.489415726
Land holdings	−2.016487693	0.61786782	−3.263623105	0.002982439	−3.284247727	−0.74872766
Land value	0.000207403	4.74797E-05	4.36825066	0.000166068	0.000109983	0.000304824

Source: Author's compilation based on author data.

TABLE 11.7 *Ultimatum Game Player 2 MAOs*

Regression Statistics	
Multiple R	0.762716802
R-squared	0.58173692
Adjusted R-squared	0.467665171
Standard error	2.379418002
Observations	29

ANOVA

	df	SS	MS	F	Significance F
Regression	6	173.2372428	28.8728738	5.09974577	0.002038019
Residual	22	124.5558607	5.66163003		
Total	28	297.7931034			

Variables

	Coefficients	Standard Error	*t*-Stat	*p*-Value	Lower 95 Percent	Upper 95 Percent
Intercept	−1.438716943	2.105504854	−0.6833121	0.501543296	−5.805266734	2.927832848
Age	0.353773513	0.480205983	0.736712006	0.469081544	−0.642112737	1.349659763
Sex	0.402155853	1.045713495	0.38457556	0.704244335	−1.766521191	2.570832897
Education	1.112168705	0.513707096	2.164986066	0.041507142	0.046805399	2.177532012
Income (in U.S. dollars)	−0.561699555	0.513282639	−1.094327983	0.285648348	−1.62618259	0.502783481
Household wealth (in U.S. dollars)	−2.146178728	0.648170116	−3.311134955	0.003177009	−3.49040127	−0.801956187
Household size	2.626594762	0.627841596	4.18353097	0.000385396	1.324530991	3.928658533

Source: Author's compilation based on author data.

TABLE 11.8 *Ultimatum Game Player 2 Minimum Acceptable Offers*

Regression Statistics	
Multiple R	0.499650365
R-squared	0.249650488
Adjusted R-squared	0.221859765
Standard error	2.876783891
Observations	29

ANOVA

	df	SS	MS	F	Significance F
Regression	1	74.34419352	74.34419352	8.983231225	0.005785226
Residual	27	223.4489099	8.275885553		
Total	28	297.7931034			

Variables

	Coefficients	Standard Error	*t*-Stat	*p*-Value	Lower 95 Percent	Upper 95 Percent
Intercept	0.582360713	1.176509332	0.494990305	0.624611241	−1.831637009	2.996358436
Household size	1.629463031	0.543661054	2.997203901	0.005785226	0.513962703	2.744963358

Source: Author's compilation based on author data.

TABLE 11.9 *Player 1 in Dictator Game Compared to Player 1 in Third-Party Punishment Game*

ANOVA						
Source of Variation	SS	df	MS	F	*p*-Value	F Crit
Between groups	1.874260753	1	1.874260753	0.534649119	0.46750486	4.001191306
Within groups	210.3354167	60	3.505590278			
Total	212.2096774	61				

Source: Author's compilation based on author data.

TABLE 11.10 *Third-Party Punishment Game Player 1 Offers*

Regression Statistics	
Multiple R	0.470882631
R-squared	0.221730452
Adjusted R-squared	0.03494576
Standard error	18.54448318
Observations	32

ANOVA					
	df	SS	MS	F	Significance F
Regression	6	2449.428586	408.2380976	1.187091137	0.345019684
Residual	25	8597.446414	343.8978566		
Total	31	11046.875			

Variables						
	Coefficients	Standard Error	*t*-Stat	*p*-Value	Lower 95 Percent	Upper 95 Percent
Intercept	47.43517131	21.45297149	2.211123589	0.036398145	3.251949822	91.6183928
Age	−2.194849519	3.647908867	−0.601673342	0.552809303	−9.707858405	5.318159367
Sex	6.457709075	7.516653525	0.859120226	0.398437301	−9.023128518	21.93854667
Education	−7.121832971	3.755024472	−1.896614263	0.069491152	−14.85545057	0.611784632
Income (in U.S. dollars)	0.935240338	3.972595039	0.235423024	0.815798247	−7.246472231	9.116952908
Household wealth (in U.S. dollars)	4.763831068	3.787620316	1.257737226	0.220108685	−3.036918932	12.56458107
Household size	2.206492677	4.217351281	0.52319395	0.605446108	−6.479304805	10.892290016

Source: Author's compilation based on author data.

TABLE 11.11 *Third-Party Punishment Game Player 3 Highest Offer Punished*

Regression Statistics	
Multiple R	0.390895087
R-squared	0.152798969
Adjusted R-squared	−0.050529279
Standard error	3.016269231
Observations	32

ANOVA

	df	SS	MS	F	Significance F
Regression	6	41.02174817	6.836958028	0.751489135	0.614108263
Residual	25	227.4470018	9.097880073		
Total	31	268.46875			

Variables

	Coefficients	Standard Error	*t*-Stat	*p*-Value	Lower 95 Percent	Upper 95 Percent
Intercept	3.770671189	3.729008692	1.01117254	0.321621015	−3.909365912	11.45070829
Age	−0.360190263	0.617971902	−0.58285864	0.565209388	−1.632927209	0.912546684
Sex	0.596155372	1.182924917	0.503967212	0.618696971	−1.840124079	3.032434823
Education	0.048051517	0.596243389	0.080590441	0.936409367	−1.179934719	1.276037754
Income (in U.S. dollars)	0.945488397	0.643006723	1.470417591	0.15392353	−0.378808728	2.269785522
Household wealth (in U.S. dollars)	−0.058198881	0.605919508	−0.096050515	0.924246274	−1.306113456	1.189715695
Household size	−0.453723075	0.578509316	−0.784296921	0.440234508	−1.645185305	0.737739154

Source: Author's compilation based on author data.

TABLE 11.12 *Sursurunga Postgame Responses to the Question: "Did This Game Remind You of Any Aspect of Customary Life?" by Range of Offer*

Response	0	1	2	3	4	5	6	7	8	9	10
Related to customary life	1			1	5	6	2				
Not related to customary life	2		2	2	1	3	2		1		

Source: Author's compilation based on author data.

TABLE 11.13 *Aggregated Results of Table 11.12*

	Game Related to Customary Life	Game Not Related to Customary Life
Made middle-range (4, 5, or 6) offer	13	6
Did not make middle-range (4, 5, or 6) offer	2	7

Source: Author's compilation based on author data.
Note: Fisher's exact test; two-tailed *p*-value = 0.0418; one-tailed *p*-value = 0.0290. Both significant at 0.05 level.

Notice that the offers of those who said that the game did seem related to at least one aspect of customary life clustered in the middle range. Table 11.13 is constructed from aggregating these results.

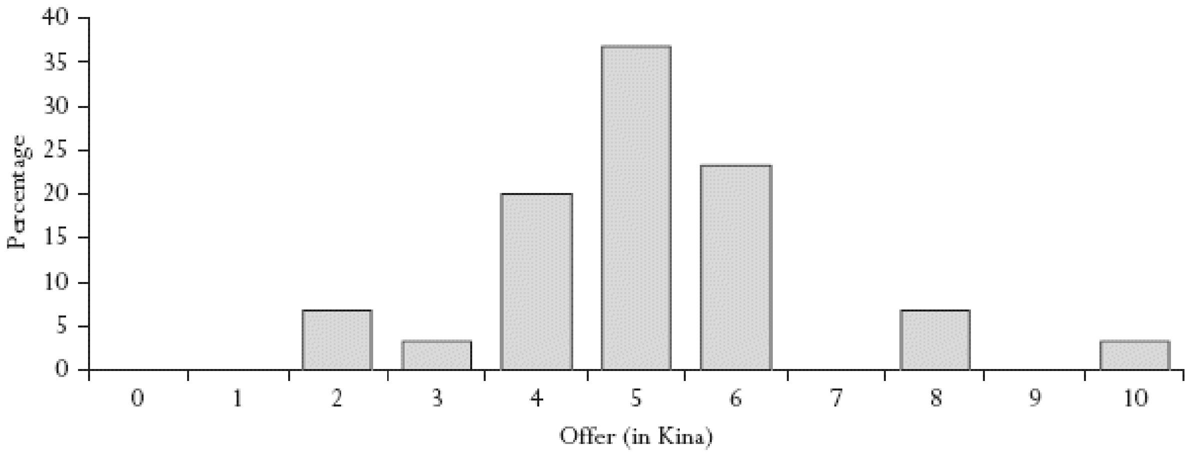
The best way to account for this significant result is that for those people who experienced the DG as cognate to an aspect of traditional life, the EM cultural template for social relations that emphasizes equal (or near-equal) sharing seems to have trumped other considerations, resulting in distributions at or near fifty-fifty.

Although this explanation is a reasonable one, it suffers from the disadvantage of relying on information that was gathered, in some cases, hours after the game was played, which left quite a bit of time for players to mentally reconstruct the event in terms that were comfortable and familiar. Furthermore, even if players reported a similarity between the game and an aspect of customary life after the game, it does not mean that that similarity was salient for them at the time they made their decision about what to offer. These not inconsiderable difficulties aside, however, I do think that the nonrandom outcome strongly suggests the salience of EM as an explanation more strongly than any other possibility.[15]

The Strategy Method Ultimatum Game

As with the DG, the modal offer of player 1s in the strategy method ultimatum game was 5 kina (see figure 11.8), but the mean was about 1 kina higher: 5.13 (or 51.3 percent of the stake). The results from the UG show that household wealth was an important variable in player 1 offers in that higher offers are correlated with greater household wealth (see table 11.4). Household wealth is importantly a function of the amount of land holdings (the correlation between these two variables is $r = 0.7773$) and the value of land ($r = 0.9231$).[16] Land, therefore, is the key consideration here, as it underlies and indeed produces household wealth. Any answer to the question of why it is that household wealth seems to produce higher offers must begin with land and landownership.

FIGURE 11.8 *Sursurunga Sample: Ultimatum Game Player 1 Offers*



Source: Author's compilation based on author data.

Salient categories of land among the Sursurunga include, in addition to residential village land, uncultivated land owned by a descent group that can be used by any member of the matriclan; garden land; and land upon which cash crops are grown (Bolyanatz 1998; Bolyanatz 2000, 47–63). The last is by far the most valuable, in large part because the value of the cash-producing species that grow on it is folded into the value of the land. (The New Ireland provincial government's standard catalog of the values of cash-producing species is used in determining appropriate compensation in the case of litigation.) Generally, those individuals with control over more hectares also have land that is worth more (r = 0.8496), since cash-cropping is considered to be the best use of land once subsistence needs are met.

One possible explanation—although there is no evidence that makes it compelling—for the land control–cum–household wealth association with high offers is that a degree of obligation on the part of those who are relatively well off to be more generous is consistent with EM. I am unable to determine with any confidence, however, whether EM was salient at the time subjects made their decisions during the UG.

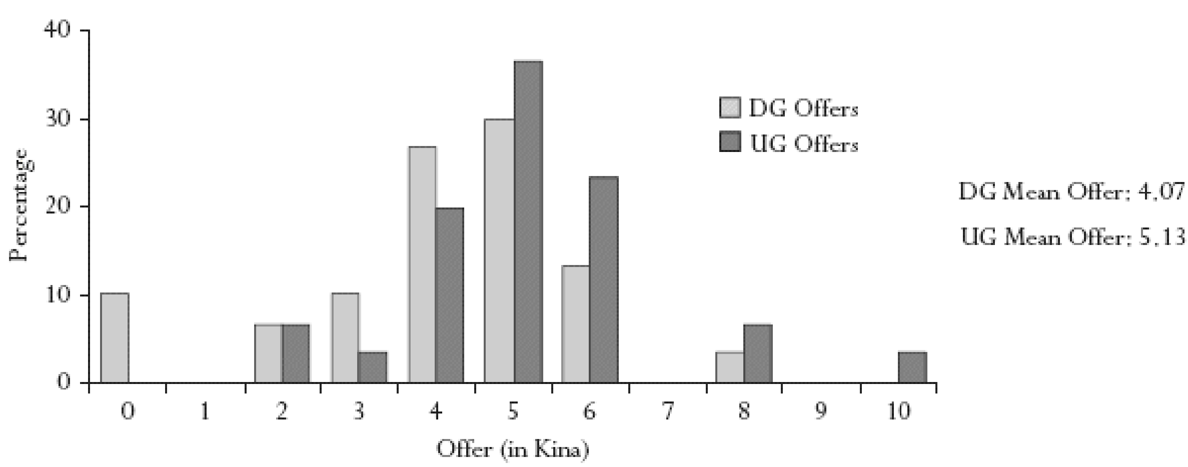
Comparing the Dictator Game and the Ultimatum Game

Figure 11.9 shows that player 1s from both the DG and UG had modal offers of 5 kina. Other than a slightly higher mean offer, there was no appreciable

difference between the two games in this regard. The only factor that seemed to affect DG offers was, as noted in the discussion of tables 11.3 to 11.11, an individual's sense of traditional sharing patterns, which is deeply influenced by an EM cultural and moral template. The modal offer of 50 percent for the UG suggests that this same template influences behavior there too, although the higher UG mean offer points to other considerations as well.

This begs the question of why economic variables (that is, the general reliance on cash-cropping relative to subsistence farming) seem to affect offers only in the UG. The short answer to this question is that economic considerations are fundamentally *social* considerations. That is, they always involve the agency of other people (which is, of course, absent in the DG): once fundamental subsistence needs have been met, there are no important nonsocial uses of wealth.

FIGURE 11.9 *Sursurunga Sample: Dictator Game and Ultimatum Game Player 1 Offers*



Source: Author's compilation based on author data.

Ultimatum Game Player 2 Results

Figure 11.10 shows the frequency of offers that were acceptable to player 2s. Tables 11.7 and 11.8 show the regressions for player 2s' minimum acceptable offers. Education drops out as significant in other regressions, as does household wealth. Household size, on the other hand, is important: the larger the household, the more likely a person was to accept unfair offers in the Sursurunga sample. At first, this might seem counterintuitive: would we

not expect attention to fairness in sharing to be heightened where there are more people to share with? But it could be argued equally that a household with more members generates a certain degree of trust that others will not needlessly withhold resources and that a stingy offer must have a good reason behind it. I have no other explanation at hand.

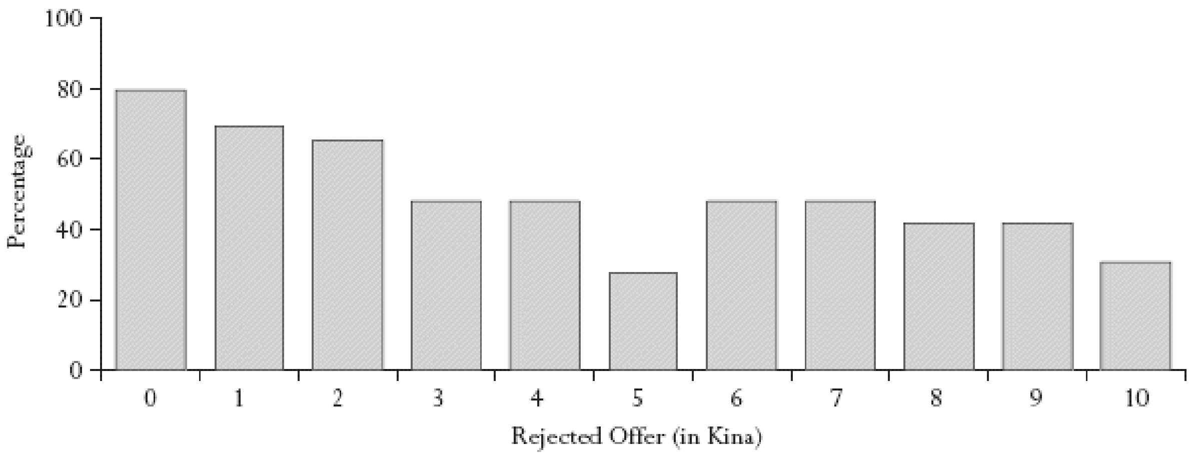
Figure 11.11 represents the minimum acceptable offers of player 2s in the Sursurunga sample; the mean MinAO was 3.72 kina (or 37.2 percent of the stake). I should note that four people rejected all offers except the 100 percent offer of 10 kina. (I address these cases later in the chapter.) Another anomalous result is that five people said that they would have accepted any offer, including 0 kina. Postgame interviews indicated the presence of a general tendency to abandon any agency in the game, best exemplified by the individuals who said, “The other person is in charge of the money; what they do with it is their business. So I will accept any decision made.”

The Sursurunga data have by far the highest rate of rejection of 50 percent offers among player 2s in the cross-cultural sample. The anomalous high rate of rejection of offers of 50 percent is problematic, and is discussed later.

The Third-Party Punishment Game

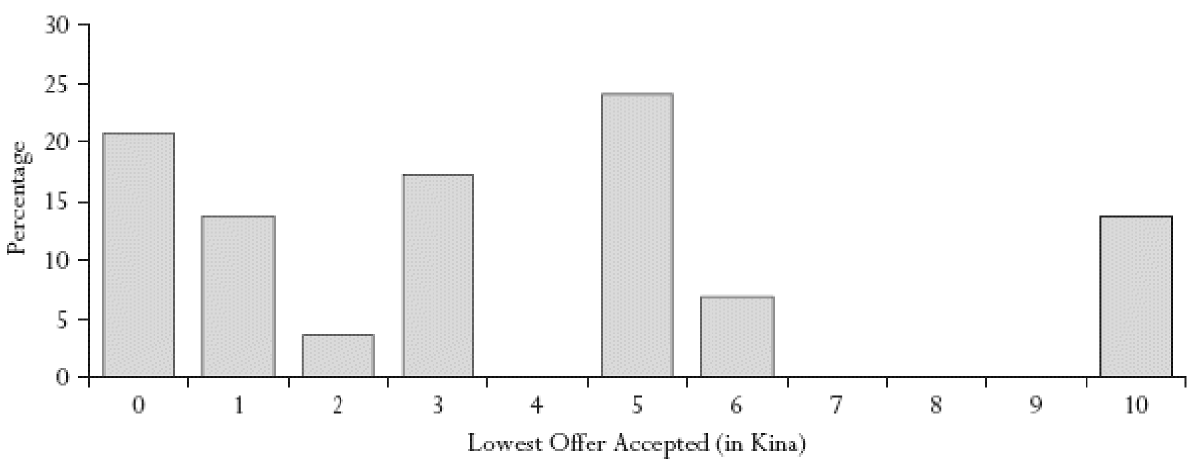
The third-party punishment game results are shown in figures 11.12 and 11.13. Figure 11.12 shows the offers made by player 1s; figure 11.13 shows the offers that provoked “punishment,” if any, meted out by player 3s.

FIGURE 11.10 *Sursurunga Sample: Ultimatum Game Player 2 Rejected Offers*



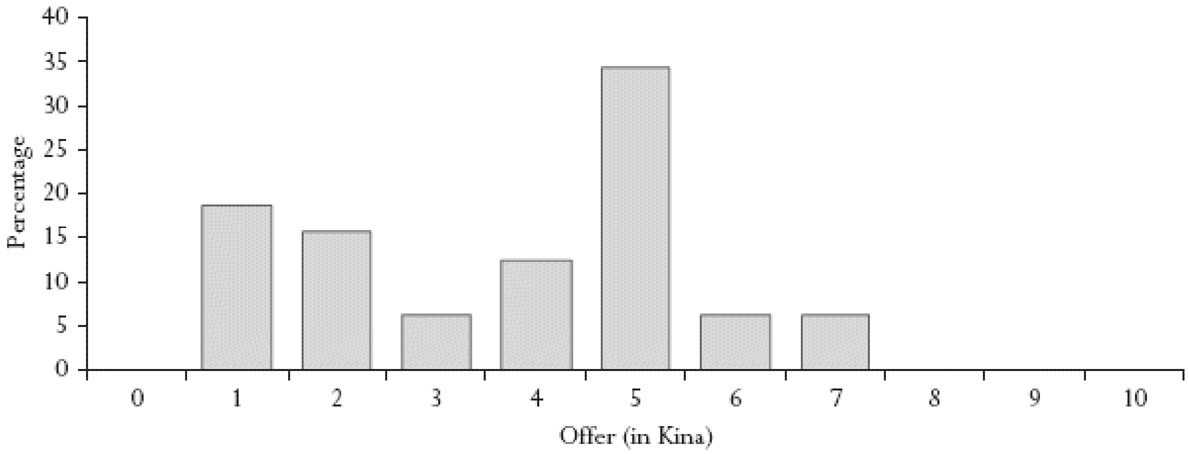
Source: Author's compilation based on author data.

FIGURE 11.11 *Sursurunga Sample: Ultimatum Game Player 2 Minimum Acceptable Offers*



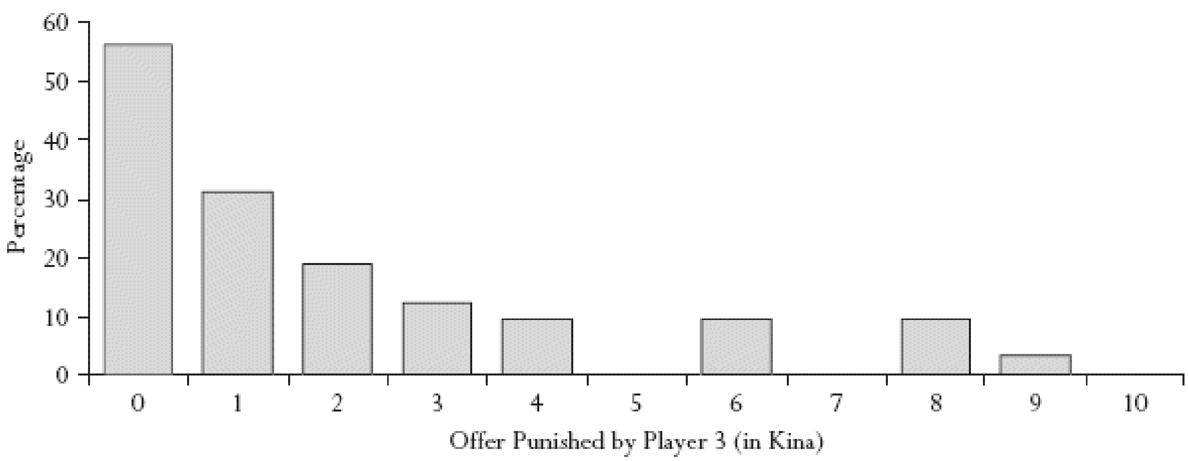
Source: Author's compilation based on author data.

FIGURE 11.12 *Sursurunga Sample: Third-Party Punishment Game Player 1 Offers*



Source: Author's compilation based on author data.

FIGURE 11.13 *Sursurunga Sample: Third-Party Punishment Game Player 1 Offers Punished by Player 3*



Source: Author's compilation based on author data.

The mean offer for player 1s in the TPG was 3.72 kina, or 37.2 percent of the stake. This figure is lower than player 1 offers in the UG, which is expected, but also lower than player 1 offers in the DG, which is *not* expected. In fact, however, the difference between the DG and TPG player 1 offers is not statistically significant ($p = 0.4676$), and given the fact that there are no demographic variables that suggest a reason for this outcome, it seems safe to assume that this is an instance of sampling error. In effect,

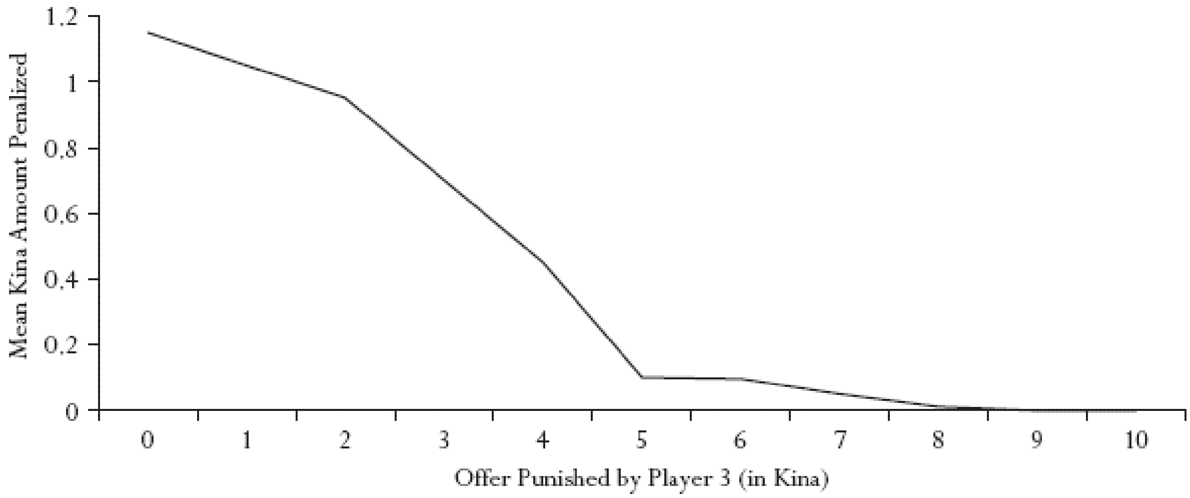
then, player 1 offers in both the DG and TPG are the same, which means that the existence of a punishing third party was negligible in decisionmaking. And as in player 1 DG offers, a regression of the six key variables (age, sex, education, income, household wealth, and household size) shows no significant role (see table 11.10).

The mean offer amount that was punished was 3.03 kina, or 30.3 percent of player 1's stake. Clearly, player 1s' extraordinarily low offers were punished with more consistency. Table 11.11 shows regressions of player 3 decisions and the six variables. And as far as the similarities between player 1 offers in the DG and TPG go, it is worth noting that no player 1 in the TPG offered 0 percent of the stake to a player 2. It is also worth noting that the pattern of TPG punishing is quite consistent with that reported by Helen Bernhard, Ernst Fehr, and Urs Fischbacher (2006) from Highland New Guinea. In that project, players 1, 2, and 3 were not always from the same ethnic group, depending on condition. Another difference was that a player 3 who chose to punish player 1 was able to do so by taking either 5 or 10 kina from player 1. While player 3 engaged in stronger punitive action when players 2 and 3 were from the same group, the decay of interest in punishing was consistent across all conditions and resembles very closely the Sursurunga TPG results (see figure 11.14, adapted from Bernhard, Fehr, and Fischbacher 2006).

Figure 11.15 compares the offers of all player 1s across all games.

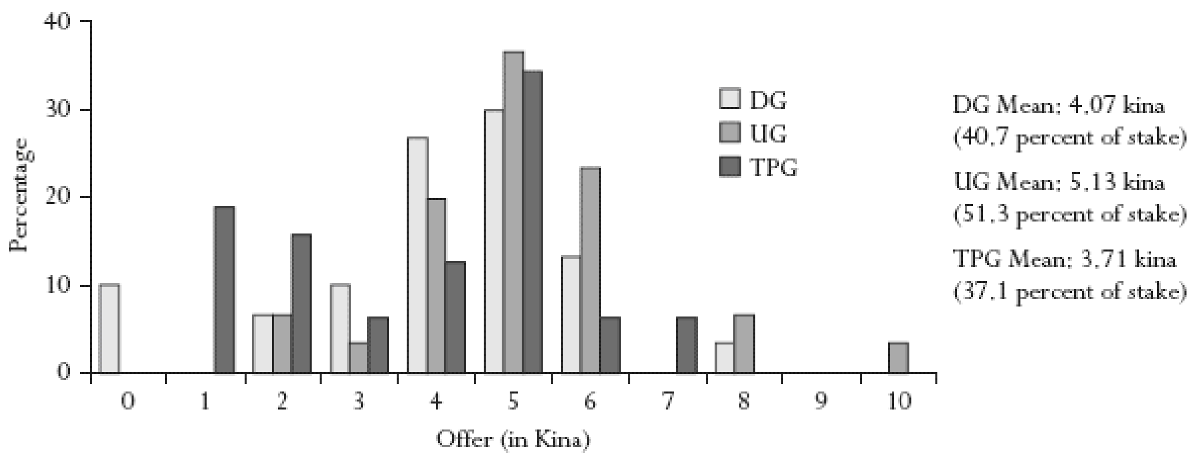
In each game, the most frequent offer was the fifty-fifty offer. This is consistent with the results from many of the other field sites and strongly reinforces the suggestion that there is an EM template at work among the Sursurunga, resulting in a default predisposition to split resources evenhandedly, as well as the affective states associated with that preference.

FIGURE 11.14 *Third-Party Punishment Game Results from Highland New Guinea*



Source: Author's adaptation of Bernhard, Fehr, and Fischbacher (2006), 219.

FIGURE 11.15 *Sursurunga Sample: Player 1 Offers Across All Three Games*



Source: Author's compilation based on author data.

DISCUSSION

Chapter 4 describes the main empirical findings of the comparative study; I will not reiterate them here. Instead, I discuss the anomalies that appear within the Sursurunga sample that are unexpected vis-à-vis the overall patterns that have been reported.

High Sursurunga Dictator Game Offers and Low Market Integration

Chapter 4 reports the strong correlation between DG offers and market integration (table 4.2) across societies. In other words, in the overall sample of groups, the lower the MI, the lower the offers in the DG—and quite strongly so (r = 0.681). The Sursurunga sample, however, is inconsistent with this association. (Indeed, taking the Sursurunga out of the overall sample of groups makes the correlation jump to r = 0.740.) In short, the Sursurunga act quite differently in this regard, relative to other groups, in that a low MI score (24, the sixth-lowest among the fifteen groups studied) occurs with a high mean DG offer of 41 percent of the stake—the *fifth-highest* DG offer, tied with the other Melanesian society, the Au (chapter 7, this volume, available at: http://www.russellsage.org/Ensminger).

This anomaly is overdetermined and springs from two sources. First is the fact that the Sursurunga have a world religion score of 1.0, and as described in chapter 4, WR is a driver of higher offers across societies. Second, and almost certainly more profound, is the Sursurunga emphasis on EM. When the postgame comments are examined, it is easy to see that EM considerations motivated much of people's behavior in the games—keeping in mind, of course, that, as mentioned earlier, people may have mentally reconstructed their own behavior and provided post hoc rationales for what they did. The comments of player 1s who offered 50 percent or more of the stake reveal the salience of the EM relational template for the Sursurunga. Noteworthy aspects of these comments have been italicized.

> "I wanted to help the other person." (80 percent)
>
> "*I wanted to give five* but made a mistake." (60 percent)
>
> "I wanted to be generous." (60 percent)
>
> "You can't give someone too little." (60 percent)
>
> "*Giving the same amount* that you keep *is what everyone else does;* you have to give more than others." (60 percent)
>
> "It is *important to share equally*." (50 percent)
>
> "I wanted *both sides to be the same.*" (50 percent)

“I wanted to *be fair and equal.”* (50 percent)

“I didn't want to feel *ashamed of not giving fifty-fifty.”* (50 percent)

“I wanted to be *fair;* I wanted to provide *equal amounts.”* (50 percent)

“I wanted *both* of us to *have the same.”* (50 percent)

“I wanted *everyone* to have an *equal share.”* (50 percent)

“Equal shares are important.” (50 percent)

[no comment] (50 percent)

Even some of those who offered 40 percent of the stake articulated a starting point guided by the EM norm and explained their deviation from that norm. Note that these comments rely on an implicit fifty-fifty default. Again, salient aspects of these comments have been italicized.

“I *want to be a person who shares [equally]*, but I also want the most for myself.”

“I *wanted to share [equally]*, but I wanted to have more than the other person too.”

“I wanted a little more than *fifty-fifty.”*

“Since the money began with me, it is all right for me to have a little more [than *half]*.”

“Because the money was given to me, I am the *more important*, so I get to keep the *most.”*

TABLE 11.14 *Sursurunga Player 2 Rejections of Fifty-Fifty Offers in the Ultimatum Game*

Subject Number	Accept 0 Percent	Accept 10 Percent	Accept 20 Percent	Accept 30 Percent	Accept 40 Percent	Accept 50 Percent	Accept 60 Percent	Accept 70 Percent	Accept 80 Percent	Accept 90 Percent	Accept 100 Percent
1				Yes	Yes						
2	Yes										
3							Yes	Yes	Yes	Yes	Yes
4							Yes	Yes	Yes	Yes	Yes
5											Yes
6											Yes
7											Yes
8											Yes

Source: Author's compilation based on author data.

In sum, there was a strong sense that a fifty-fifty split is the ideal—as is the case for the EM social relations template—and it was articulated even by some people who did not conform to the norm and failed to make the fifty-fifty offer. It is then no surprise that, even with a relatively low MI score of 24, the Sursurunga DG offers would be so high (41 percent) that they approached 50 percent.

Player 2 Rejections of Fifty-Fifty Offers

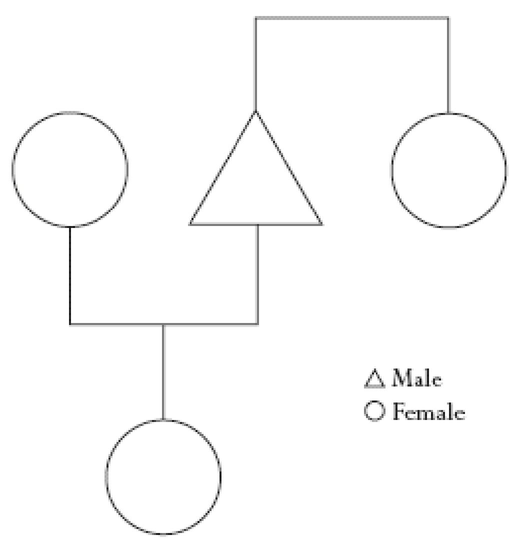
Perhaps one of the most surprising results is the 28 percent (eight out of twenty-nine) rate of rejection of offers of 50 percent of the stake by player 2s. One possible explanation is that these player 2s simply did not understand the game. This seems not to be the case, however, at least not for all of them. For one thing, between those players who accepted offers of 50 percent and those who rejected offers of 50 percent, there is no statistically significant difference ($r = 0.077$) in the number of examples required before the game could proceed, indicating that understanding was unlikely to be the predominant basis for these results. Those individuals who rejected fifty-fifty offers also fail to show any age, sex, education, or economic similarities. Indeed, when level of education is considered, a not significant but clear trend is that those with *more* education were likely to reject offers of 50 percent.

Although this result offers compelling reasons to abandon any effort to find a trend in player 2s rejecting 50 percent offers, it remains possible that some players misunderstood the game. Two player 2s who rejected 50

percent offers did exhibit a pattern, reinforced by their postgame comments, that suggested a lack of understanding in that the only offer they accepted was 100 percent (subjects 7 and 8 in table 11.14). Both players revealed in their postgame interviews that they imagined that they were maximizing their income with a response of only 100 percent. Their correct answers in the pregame trials, then, could only have been "lucky guesses," unless something later interfered with their working memory.

Postgame interviews also provided some insight into other subjects' reasoning. Showing some confusion, subject 1 (a thirty-two-year-old female) indicated that she wanted more than 50 percent, but actually accepted less. When she made the decision to reject, she may have thought she had accepted—that is, that she misunderstood. But if this is so, then her pattern would have been to accept 0 percent, 10 percent, and 20 percent, which she did not. It is almost as if her understanding was intermittent.

FIGURE 11.16 *The Relationships of the Four Sursurunga Subjects Who Rejected All Offers Except 100 Percent in the Dictator Game*



Source: Author's figure.

On the other hand, subject 2 (a twenty-eight-year-old male) did say that he had misunderstood, having realized as much almost immediately after the experiment had been conducted. This would have made his response equal to those of subjects 5 through 8.

Subject 3 (an eighteen-year-old male) said that he believed that player 1 was entitled to just a bit more than 50 percent. With the same pattern of acceptances and rejections, but with different reasoning, subject 4 (male, age forty-one) simply said, “I wanted the greater share.” (Again, note the EM default.)

Of the eight people who rejected offers of 50 percent, four (subjects 5 through 8) rejected *all* offers except the 100 percent offer of 10 kina. These four closely related individuals (see figure 11.16) offered postgame explanations of their decisions that were almost identical: “I wanted all or nothing.”

It is easy to dismiss these four individuals as exceptions, especially since, other than their relatedness, there is no demographic or economic reason for their choices. Contamination can be discounted as an explanation because the games were played so closely together—back to back in the case of the father and daughter and then again later the two sisters-in-law—that there was simply no time for it, even if the opportunity to interact had been available. In the end, I cannot fully explain this phenomenon. I can only say that these individuals were somewhat socially peripheral, and this apparent “demand behavior” (see chapter 3 for similar responses in Missouri) is consistent with how I had known them over the past two decades. The male was a renowned hothead who consistently violated local norms related to peaceful conflict resolution. That it would be these four people, then, demanding all or nothing in the context of this game is not particularly surprising to me, nor would it be to many people in the villages where these individuals were known.

The Rejection of Hyper-fair Offers by Player 2s

The rejection of hyper-fair offers is not unique to the Sursurunga in our cross-cultural sample. However, since the Sursurunga were included in the project in order to determine whether the phase 1 results from mainland New Guinea (Tracer 2004) would be replicated (see chapter 1), it is worth addressing the phenomenon of hyper-fair offer rejection. As with other aspects of Sursurunga behavior in these games, the rejection of ultra-high or hyper-fair offers by player 2s in the UG is also consistent with an EM norm, such that a deviation from fifty-fifty introduces the possibility of experiencing an unsettled disquiet or dissatisfied affective state. Here are

some UG player 2 responses to the question: “How would you have felt if the other person had offered you [the maximum] 10 kina?”

> “I would feel sorry that the other person wouldn't have any.”
>
> “Not too good. [*Interviewer: In what way?*] I would have felt ashamed.”
>
> “I would worry about the other person.”
>
> “Ashamed, and pity for the other person.”
>
> “I'd be happy, but it would be mixed with shame because the other person has nothing.”
>
> “It doesn't feel right that I should get it all.”
>
> “Not good, because then player 1 would have nothing.”
>
> “A bit ashamed, because the other person has nothing.”
>
> “Happy, but pity for the other.”
>
> “Happy, but a little embarrassed and sorry for the other person.”

The sense that something would be relationally amiss in accepting an ultra-high offer is a corollary of the fifty-fifty norm and is also reflected in both the rejections of ultra-high offers and the comments about such offers.

As noted in chapter 4, the player 2 acceptance rates in the UG as played by Sursurunga subjects conform to a pattern found elsewhere. The Sursurunga results indicate that David Tracer's (2004) Au and Gnau outcomes were not anomalous: in all three of these societies, there exists a strong wish to avoid receiving too much. In a part of the world that has long featured competitive forms of feasting (Young 1971) and extravagant exchanges (Strathern 1971), there is really little surprise in these data. Indeed, giving-with-a-purpose has become institutionalized in at least one aspect of Sursurunga life, and it is the strength of the EM relational pattern that makes an unbalanced hyper-fair offer—and especially an intentionally unbalanced offer—understood as a premeditated effort to utilize the EM norm for one's own purposes. The Sursurunga institution known as gomgom is a context in which unbalanced munificence is understood and experienced as an attempt at the public humiliation of a rival, enemy, or detractor. A case

from 1998 exemplifies how gomgom constitutes aggressive giving-with-a-purpose among the Sursurunga.

Sokip (a pseudonym, as are other names in this account), in his late twenties and a father of two children, is at home one afternoon and decides that he will contribute shellfish from the reef to the evening meal. Because the exposed reef is very sharp, he borrows his wife Tinkus's flip-flops to search for shellfish on the reef. Not too long after Sokip leaves home for the reef, Tinkus returns from the garden, searches for her flip-flops, and becomes very frustrated at not being able to find them. Sokip returns home with the flip-flops, and Tinkus's frustration turns to rage directed at Sokip. Tinkus screams at Sokip, indicting him for having no respect for other people's property and being, in general, a ne'er-do-well. The screaming is loud enough that Sokip's mother and brother, Tinamel and Tobim, respectively, who live a few meters away, come over and try to settle things down. This only enrages Tinkus further, and after blasting her brother-in-law with a few choice words, she even takes a halfhearted swipe with a bush knife at Tinamel, all the while using very abusive language.

Things eventually simmer down, but bad, awkward feelings remain in the days and weeks that follow. Tinkus and her next-door-neighbor mother-in-law (a traditional work unit) observe a chilly truce, but no one is comfortable with the situation, least of all Sokip, whose wife and mother live next to each other and are not getting along. In order to try to resolve the situation, Tinamel decides to sponsor a small (three pigs) gomgom feast.

For the gomgom, everyone in the village (about 110 people) is publicly invited. A date is set, and plans are put into motion. Others can provide supplementary food, but the enatic unit of Tinamel, Tobim, and Sokip are primarily responsible for the feast. The villagers will spend the day eating (and eating well) and visiting in a festive atmosphere. The exception to this will be Tinkus. The decision of her husband's lineage to sponsor a gomgom places her on the horns of a dilemma. If she participates and (publicly) enjoys the largesse of her mother-in-law and her mother-in-law's kin, she cannot continue her feud with her mother-in-law, fueled with glares and steely silence. To be given something and to reciprocate with ill will is simply not done—the damage to her reputation would be profound and nearly irreparable. On the other hand, if she chooses not to participate in the gomgom, she will be making a public declaration that she is untroubled by

the notion that the hard feelings could continue indefinitely, even though her antagonist is ready to bury the hatchet.

Tinkus is in a lose-lose conundrum: if she fails to attend the gomgom feast and participate, she thereby publicly rebuffs her affines' attempt to make things better. If she does attend and participate, she is thereby required—upon pain of serious damage to her reputation—to reestablish a normal relationship with her mother-in-law. They have her. In the gomgom context, (over-) giving is an unfriendly, even somewhat hostile, act because it is an attempt to exert control over the behavior of another.[17] In short, through a magnanimous, over-the-top (and utterly unilateral) gesture, giving too much actually benefits the giver rather than the receiver. This, then, is why some (but not all) of the Sursurunga player 2s in the UG would not accept offers that were too high: the affective consequences would have been unpleasant. It is also probably part of the reason why player 1s seldom gave hyper-fair offers (that is, they had little wish to "aggress" against an anonymous other), but that cannot be demonstrated.

CONCLUSIONS

The references to embarrassment and shame in some of the statements gathered after the games bring us to a concluding discussion that centers on Sursurunga emotion terms.

When I asked people to elaborate on "feeling shame," they offered the indigenous term "rumrum," an intransitive verb that can also be glossed as "shyness" or "embarrassment." Rumrum is unpleasant anxiety about what others might think or say and is cognate (not lexically, but in terms of experience) with "vavirvir," from the nearby and historically related Tolai (Epstein 1992, 221–29). For the Tolai, vavirvir is the unpleasant "awareness of the gaze of others" in the context of risking "one's breach of custom or propriety" (Epstein 1992, 221). Rumrum, in short, is a hypercognized concern for one's reputation.[18]

"Rumrum" is the term most often used in the context of a botched feast—at least by men. "We would feel shame [rumrum] if we didn't have a proper feast," said one man. In other contexts, anxiety over avoiding rumrum (for example, by being thought of as a cheapskate) is a powerful motivation to not withhold resources—or, perhaps more to the point, to avoid being seen as a withholder of resources. And this is precisely what can be seen in many

of the responses provided: the unpleasant affect of rumrum is experienced when an economic imbalance is decidedly in one's favor. This affective feature of an elementary social relation—in this case, EM—has a significant proximate causal influence on behavior (Fiske 2002).

Contrasting with rumrum is “laes,” or “feeling pride.” In gomgom, there can be a strong sense of satisfaction in performing acts that cause one to suffer economically but flourish reputationally; for the Sursurunga, it really *is* better to give than to receive. Sponsoring a successful mortuary feast also generates the pleasant affect of laes, in that one's reputation is likely to be enhanced but also, more pointedly, in the absence of fodder for infamy in the eyes of others. Unlike the self-aggrandizing behavior found in other parts of Melanesia, established leaders on New Ireland—“big-men,” if one prefers—are far more interested in avoiding rumrum than in laes-grasping (Clay 1992).

Laes, as one of the more “noble” emotions, is seen to have its source in the center of the breast, while rumrum and the more generic cover term “bál i sák” (the same term, “one's belly is bad,” used earlier to describe the feeling one has when receiving a hyper-fair offer of pork) are grounded, like most other less noble emotions such as anger and lust, in the belly. The related wishes to avoid rumrum and to experience laes together form an important part of the motivational basis for EM behaviors, including fifty-fifty offers in the DG, UG, and TPG. (It is less clear what emotion drives player 3s in the TPG, although the working hypothesis is that it is the same.)

When it comes to postgame comments about the sentiments motivating people toward balance (rather than avoiding imbalance), the most common response was the expression “marimari,” which has entered New Ireland from Kuanua, a related language on neighboring New Britain via the Methodist (now United) Church. The word is probably best translated into English as “mercy,” but it also has connotations of “sympathy” and “pity.” The word is used in Neo-Melanesian speech (as in “marimari bilong God,” or “God's grace”) rather than in Sursurunga and rightly belongs in that lexicon. What is striking, however, is that people did not use the Sursurunga term “mámnai,” which is a transitive verb (and has an intransitive form, “armámna,” that functions as a noun) used to express reasons for helping people in many different everyday contexts: house-building, providing tobacco or betel nut, carrying a load, and so on.

Although the postgame interviews were conducted in Tok Pisin, when people used words that I knew had wider semantic domains, I asked for vernacular terms, and when I asked people who said they “had pity” and wanted “to help” others for clarification, they responded, “Marimari,” almost every time. The easiest—and, I think, best—explanation for the preference for marimari over mámnai or armámna is that marimari is associated with church. (Until around 2008, the hymnal used in United Church services each Sunday and in numerous midweek services was in Kuanua, the language of the Tolai on the Gazelle Peninsula of neighboring New Britain.) In short, there seems to be something of a “church-morality-sharing” suite of understandings that I believe coalesced with the arrival of Christianity into an EM template.

The Sursurunga data show modal offers of fifty-fifty in each of the experimental games. Furthermore, this norm is not profoundly affected by demographic or economic variables, and a strong EM priority results not only in modal offers of 50 percent but also in higher-than-expected (that is, higher when the MI of 24 is considered, cross-culturally) rates of rejection and punishment of offers that stray too far from that norm. A strong preference for equal matching is very clearly a key driver in fifty-fifty offers. The same can also be said of a world religion (Henrich et al. 2010), in the presence of which the salience of marimari also predisposes people to produce higher offers and, as player 3s, to punish at higher levels than would be expected in a small-scale society that is relatively underintegrated into the world of cash-based markets.

NOTES

1. I became familiar with the Sursurunga during a field trip from November 1989 to March 1992, and that familiarity grew with subsequent field trips in 1998, 2002, 2003, 2005, 2009, two trips in 2010, and one more in 2013. See Bolyanatz (2011) for a recap of my changing role as an ethnographer there.

2. I also carried out the DG and UG with betel nut (*Areca catechu*), an everyday item of exchange throughout much of the region. This chapter describes only the results of the games, including the TPG, played with cash. Elsewhere I address the betel nut games and provide a comparison of the results using cash and betel nut as exchange media (Bolyanatz 2010).

3. For more detailed discussions of the Sursurunga area as well as the ethnography of the people who live there, see Hutchisson (1984, 1986), Jackson (1995), and Bolyanatz (2000).

4. This count of 157 people includes those who typically live elsewhere much of the year, including students and those whose employment takes them to other parts of the country for significant periods.

5. Later in the chapter, I give one example of a rare instance of pork being consumed under nonmortuary circumstances. It is almost always boars that are hunted. Local methods of pig husbandry rely on wild boars to inseminate village sows. Pigs of both sexes are allowed to forage for food in the bush throughout the day. Sows deliver their litters in or around the village, and the piglets learn quickly to stay near food sources—either their mother or the humans who tend her. Male pigs are later castrated so that they do not "go wild" and will return to the village with the females each evening. Every now and then, however, a male is not castrated soon enough (the norm is around eight months) and does "go wild."

6. Sometimes Namatanai is an indirect source of goods, as when local store owners buy products at Namatanai for later resale in distant villages.

7. In fact, a more accurate and more literal rendering is "the belly bads." Sursurunga generally does not have adjectives as an English speaker might think of them. Rather, intransitive verbs are used to convey characteristics of objects and people.

8. The number 125 represents only those individuals who were engaged in decisionmaking: player 1 in the DG (N = 30), player 1 in the UG (N = 30, most of whom also served as player 1 in the DG), player 2 in the UG (N = 29), player 1 in the TPG (N = 32), and player 3 in the TPG (N = 32).

9. Since my original research stint among the Sursurunga was under the auspices of the Summer Institute of Linguistics, a mission and research organization, it is not impossible that unbelievers did not feel free to express their absence of belief to me. I am inclined, however, to reject this explanation for my finding that 100 percent of the Sursurunga claim to be Christians, since other groups—including the other two Oceanic population samples, the Au and the Yasawa—report the same thing.

10. Tok Pisin's originated with the Yankee whaling vessels of the 1840s (Keesing 1988). Young men from various Pacific Islands were hired to work on these ships, and the patois that emerged was the beginnings of the creoles known as "pidgins" in different locations, including Hawaii, the Solomon Islands, and Vanuatu. The Papua New Guinea version—Tok Pisin, or Neo-Melanesian—has its historical roots in the New Britain and New Ireland region, giving this part of Papua New Guinea a long history of familiarity with Tok Pisin. My estimate is that anyone born since the end of World War II and native to New Ireland speaks Tok Pisin.

11. In other words, even a person listed as having undergone only one example had had the benefit of the group teaching, three examples in which I told the outcomes, and four examples in which that person told me the correct outcome.

12. Regressions were made with rescaled data in which all results were divided by the standard deviation of a particular variable.

13. The phrase "customary life" is a translation of "laip bilong ples" (village life) in Tok Pisin and captures the connotations of both "everyday life" and "traditional life."

14. Usable responses are those that were not versions of "I don't know" or "I can't decide."

15. Since the same reservations with regard to the postgame interviews could be registered for each of the experimental games, there is no need to repeat them later.

16. "Land holdings" refers to descent group–owned land that is consistently used without challenge.

17. In the end, Tinkus did appear at the gomgom and participated fully. I left New Ireland several days after this event and so have no idea of the final denouement, if any.

18. For the coining and articulation of the twin concepts "hypercognition" and "hypocognition," see Levy (1973).

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Chapter 12

Maragoli and Gusii Farmers in Kenya: Strong Collective Action and High Prosocial Punishment

Edwins Laban Gwako

In an effort to capture the middle of the market integration spectrum, we included two modern farming communities in Africa in our cross-cultural world sample: the ethnically related Maragoli and Gusii of Kenya. Like many farmers in Kenya and other more developed countries on the continent, the Maragoli and the Gusii are well educated and highly diversified in their household economic strategies. In one marked respect, however, they are very different. The Maragoli are considerably less well endowed economically than the Gusii by virtually all measures.

The Maragoli and Gusii share a common ethnolinguistic ancestry, but there are stark differences in the contemporary economic situations of the two samples represented here. Although both ethnic groups inhabit relatively lush agricultural zones, the Maragoli suffer from extreme population density, and their land holdings are small (averaging 0.2 hectares); thus, many Maragoli have been forced off the land in search of better economic fortunes. Much of the Gusii community at large suffers exactly the same fate as the Maragoli, but the specific Gusii population represented here benefited from residing in the Nyansiongo resettlement area.

The colonial administrators had displaced the original occupants to create space for the white settlers, who brought large-scale farming in dairy cattle, tea, and coffee to the area. In 1962 the same authorities established a boundaries commission to formulate a strategy for returning the land to the Gusii because some of the white settlers were eager to leave before the country attained independence in 1963. At the time of independence, the Gusii who settled there were some of the most politically well connected and privileged under the colonial authorities; most of them were sons of the politically powerful during the colonial era. They were rewarded with large

plots, and today they are still well endowed with land and enjoy a comfortable economic situation. They have large pieces of land that they use to produce food and cash crops. Most of them derive income from their farming activities sufficient to enable them to invest in both farming and nonfarming ventures.

Compounding these differences between the two ethnic groups in economic endowment is the fact that the Maragoli games were run during an exceptionally bad local drought in 2003, while the Gusii games were run in 2004, a year of favorable rainfall and improved local farming conditions. These stark differences in economic circumstances do generate different effects within and across these two societies when we look at the distribution of offers and the regression statistics. However, there is considerable similarity between the Maragoli and the Gusii compared to the rest of the cross-cultural sample.

As is common in many developing societies, both the Maragoli and the Gusii have high out-migration for urban employment. Perhaps in response to this high out-migration rate, women's groups and church groups in both communities have assumed great significance and become particularly strong and effective forms of collective action.

The most dramatic findings from these experiments are the high levels of prosocial punishment that we find in both societies. In both the ultimatum game (UG) and the third-party punishment game (TPG), the Maragoli and the Gusii have the highest levels of punishment of any of our cross-cultural sample, and in both games and both societies, this is the case by a fairly significant margin. What makes this particularly surprising is that neither society consistently demonstrates high offers in these games, nor in the dictator game (DG). In fact, in the DG both societies have mean offers below the mean of our cross-cultural sample. In the UG, the Maragoli have the lowest mean of all the societies we studied, but there were some extenuating circumstances for this game, which are addressed later. For the TPG, both societies' mean offers were above the mean for the entire cross-cultural sample, but they were not at the top of the distribution.

So why do we find such exceptional vigor in punishment behavior among the Maragoli and the Gusii? The explanations may lie in the ethnography of the sites. First, sharing in both societies has historically been tied to kin relations, and despite the relatively high level of market integration in both societies, as measured by education and integration into

national wage and trading markets, these rural communities are still transitioning to new forms of organization that require that they depend on relationships with nonkin. This may account for the fact that offers in the economic experiments are not as high as we might expect for societies that seem to be highly market-oriented. But why then do they engage in such high prosocial punishment behavior? Successful collective action depends on the ability to monitor and discipline free riders. It is a reasonable deduction that this monitoring behavior has been internalized by the population, and that they brought this norm into the experimental situation in the form of readiness to punish nonsharing behavior in the economic experiments.

THE ETHNOGRAPHIC CONTEXT OF SHARING AMONG THE MARAGOLI

Maragoli is the home of the Avalogoli people (also known as the Logoli), who were originally known to the colonial government as part of the larger cultural linguistic Bantu group, and more specifically as the Bantu Kavirondo Tribe (Abwunza 1997). Maragoli villages are clan-based. Each clan is headed by a patriclan elder known as a “ligulu” (“maguru” in the plural). Some large clans are subdivided further and placed under the headship of different elders.

The Maragoli occupy an area of 198 square kilometers immediately north of the equator and on the eastern fringes of the Rift Valley's Lake Basin. The landscape is made up of intensely farmed smallholdings nestled among undulating hills and valleys with a vast network of brooks and streams. The soil, climate, and well-distributed annual rainfall (1,800 to 2,200 millimeters) provide a favorable environment for sedentary agriculture and mixed farming, which support a wide variety of cash and subsistence crops such as tea, maize, finger-millet, lentils, squash, avocados, pumpkins, cowpeas, sugarcane, sorghum, cassava, sweet potatoes, carrots, and French beans grown between the larger clusters of banana, mango, guava, and eucalyptus trees (Mutongi 2007). They also keep a number of different types of livestock. Maragoli women have always shouldered much of the responsibility for agricultural production (Verma 2001), and that remains the case today, especially in light of high rates of widowhood and the absence of men for wage employment.

The hut and poll taxes imposed by the colonial government, which all Kenyan households were forced to pay, created the need for cash and triggered male out-migration in search of wage labor. This trend had a significant impact on gender relations within the household, with women taking up absentee men's roles (Verma 2001) and the number of female-headed households increasing. The Maragoli have also suffered some of the highest rates of widowhood in Kenya (Mutongi 2007, 4; Verma 2001). Ritu Verma (2001) found that fourteen out of thirty-nine women in her survey were widows, and two out of seven men were widowers. This is partially a result of the large Maragoli population and limited land, which in recent years have also contributed to the forced out-migration of men to urban centers in search of work; once in the cities, they face a host of dangers—car accidents, industrial accidents, and a variety of diseases. More recently, AIDS has created an overwhelming number of widow-headed households and is rapidly changing the nature of family relations in western Kenya. The same applies to the Gusii site. Today wage laborers in this area include teachers, civil servants, workers in the hospitality industries (hotels, tours, and so on), tea factory workers, religious leaders, bankers, shop attendants, watchmen, and housemaids.

Although the Maragoli are similar to many modern farming societies in Africa, they stand out in several respects. A number of studies (for example, Abwunza 1997; Bradley 1997; Crowley and Carter 2000; Republic of Kenya 1997) indicate that the Maragoli have historically had the highest fertility rate in Kenya; consequently, population density is very high, about 1,100 people per square kilometers. This undoubtedly helps in part to explain their disproportionate investment in education (mean level of education is 12.5 years among the sample) and a historically high incidence of labor migration to the large cities of Kenya. The Maragoli are also unusual in that almost all adults are trilingual—fluent in both Kiswahili and English (the language of the schools and government) as well as in a local Logoli dialect that is particular to their ethnic group. And finally, as noted earlier, the high percentage of widows and widowers is a consequence in part of the AIDS epidemic, which hit this area early and so hard that life expectancy has fallen to below fifty-five years (for a discussion of AIDS in Maragoli, see Korongo 2001).

The Maragoli practice both farming and animal husbandry, even though their high population density has led to a loss in grazing land and,

consequently, to a decline in herds. The tiny plots limit cash-crop production; although the Maragoli are no strangers to cash crops, they tend to use their scarce land for home subsistence production.

Today the Maragoli engage in a range of diverse and multiple income-generating activities, from the production of food, cash crops, and trade in agricultural produce and livestock to the sale of used clothing, consumables, and pottery. In the rural area, wage labor positions are scarce. It is mainly the women who farm as men work or look for work in the wage labor sector, usually outside the area.

Maragoli benefits from close proximity to two major cities: Kisumu, the third-largest city in Kenya and the administrative headquarters of Nyanza Province (located on the shores of Lake Victoria); and Kakamega, the administrative headquarters of western Kenya (Verma 2001). This proximity to two urban centers provides access to a wide variety of agricultural and income-generating activities, including the sale of food and cash crops, trade in agricultural produce and livestock, and the sale of used clothing, consumables, pottery, and bricks.

The primary domestic unit among the Maragoli is the patrilineal extended family homestead (enyumba/mugutsi). Maragoli people continue to be organized around the principle of patrilineal descent, but the sharing behavior of the past has eroded considerably. Sharing pervaded the economic, political, and social spheres of Maragoli life in the past. Sharing with needy family and community members was esteemed as a paramount cultural virtue by the Maragoli. This spirit of compassion and reciprocity was exhibited during both informal and formal visits and during times of plenty as well as periods of shortages. Sharing extended outward from members of a household/family (inyumba/mugitsi) to more distant relatives and friends. The sharing obligation generally took the form of an animal (such as a bullock, cow, heifer, ox, goat, sheep, or chicken) or a portion of a slaughtered animal, and less frequently a quantity of grain (eleusine or sorghum). Failure to honor sharing obligations resulted in strained relations or disputes among the relatives concerned. When relatives were unable to reconcile on their own, the matter was taken for arbitration before the council of the magura (the clan-elders; “liguru” in the singular) or, in lesser cases, before a group of relatives on either side.

In cases of economic, social, and political distress (for example, overdue school fees, crop failure, natural disaster such as a lightning strike, illness,

or death), there was an expectation of significantly more sharing. Sharing was also expected during important celebrations (weddings, child-naming rituals, honoring the dead, circumcision, and so on). Sharing in these ways was an affirmation of kinship relations.

The sharing obligation also entailed making time to attend all rites and ceremonies performed on behalf of a member of one's own kin-group, even for those not actively participating in the activities. Maragoli people practiced reciprocal sharing obligations and claims to inheritance, which served to establish and maintain economic ties toward one's kin. Kinsmen shared the obligation of raising uvukwi (bride-wealth) and the resources needed for initiation ceremonies. The sharing obligation, the exchange of gifts, and hospitality were some of the major means of establishing and maintaining relationships. The nature and variety of forms of sharing and the number of people involved were viewed as an indication of the strength and scope of one's network.

Sharing was most intense at the family level. The group of persons who regularly shared food in the family comprised the members of the nuclear family and those married sons and their wives who had not yet set up their own fireplace. Maragoli say, “Mwana wovo ni mugingi vo mgongo” (Your child is the supporting stick of your back). Good Maragoli children were also expected to share their resources with their parents. Offering financial support to parents on a timely and regular basis was one of the important ways in which children were judged. All parents and children were expected to share (to give and to receive), most particularly among those from umuliango gwitu (from our household) and from the same inyumba, or lineage. Sharing relationships within tsinyumba (“inyumba” in the singular) gave members a sense of security. The bond between the individual and the group provided the “good life”: peace of mind, children, land, and cattle. The fulfillment of this bond necessitated sharing within the collectivity, and that was the Maragoli social safety net. This norm has also been noted among the Samia (Cattell 1997) and Tiriki (Sangree 1997) of western Kenya.

Much of the cash that was shared came from husbands, older children, parents, in-laws (parental and sibling), aunts (“mothers”), uncles (“fathers”), sisters and brothers (including cousins), and neighbors. Commodities were also shared with relatives, friends, and neighbors. A

good reputation in the community was earned by giving, but also afforded one the right to draw upon the community when in need.

Sharing and informal hospitality were also very common among neighbors. Neighbors informally dropped in at each other's houses to deliver a share of freshly harvested maize, vegetables, tomatoes, and onions or even to obtain supplies like salt, sugar, or laundry soap. A guest who imposed on the hospitality of other people and failed to reciprocate was disliked, but rarely flatly refused food by his or her host. Food-sharing was also an indication of a fairly high level of food supply, which allowed people to display a significant degree of generosity. The Maragoli usually offered copious quantities of tea and porridge to visitors.

Sharing norms are different today, perhaps in part because of increasing scarcity associated with severe land shortage. It has been suggested that children increasingly neglect and even decline to share resources with their aging parents (Bradley 1997; for additional evidence of this trend in other western Kenya societies, see Cattell 1997; Sangree 1997). In recent times, Maragoli wives do not automatically share cash gained through trading and self-help activities even with their husbands, although such demands are made. More commonly, they avoid these demands by immediately spending the cash on commodities like tea, sugar, utensils, and kerosene (Abwunza 1995, 1997). This is also an effective strategy to ensure that husbands do not use the household's scarce resources to buy alcohol. There is an assumption among Maragoli people that women “always” have cash, but that women selectively choose with whom and when to share their money. Even today women's self-images and reputations within the community are enhanced as the cash and commodities they voluntarily share circulate in their network of kin and nonrelations.

For economically poor individuals and families, remittances from relations are important to their well-being. In particular, older members recognize that their children may eventually care for them and that the types of relationships they have with their children, stepchildren, grandchildren, and daughters-in-law affect the types of resources and care they are likely to receive in old age. Consequently, they use the resources that remain in their control strategically to negotiate for care and resources in the future. For instance, older women continue to control banana plantations and the distribution of the products from them, such as intercropped vegetables, as well as the banana leaves and stalks used as green manure and fodder. They

also control products from family woodlots and allocate livestock for ceremonial purposes. These resources are sometimes shared in a carefully calculated manner in order to gain access to food, labor, and inputs from grandchildren and daughters-in-law. Older women also continue to draw on resources from reciprocal sharing relationships maintained with their own married daughters and often call in unpaid debts pertaining to uvukwi (bride-wealth). Older women often care for grandchildren, and they use the sharing of this important labor input to negotiate other resources in return. The amount of sharing extended from children to their parents may also be determined by the extent to which they believe that their parents may curse or bless them. However, most Maragoli young people now view curses as “superstition” (Bradley 1997).

Maragoli people are nowadays increasingly less likely to engage in sharing with more distant kin owing to the drastic increase in the cost of living and the dwindling availability of productive resources. The high cost of food, clothing, school fees, health care, farm labor, farming inputs, commuting, and other livelihood expenses has made people more self-oriented than ever before. Sharing is no longer a predictable, secure, or stable source of money or productive resources, even within the family. People's personal economic circumstances at any given time might make them unable to share even with their own siblings and other immediate kin, causing them much pain and grief. Their ability to share might vary from day to day, through their life cycle, or during disasters that are beyond human control (such as flooding, drought, famine, or HIV/AIDS).

As traditional patterns of sharing among kin have declined, they have been partially replaced by strong church and women's organizations. The Maragoli are primarily Quakers, with a small number of Catholics. The Kenyan Quaker church was founded among the Maragoli in 1902 and still has its Kenyan headquarters there. The Maragoli people also turn to other types of relations and channels of access to resources, such as government welfare programs, politicians or other wealthy individuals, and theft. The fact remains, however, that the economic fortunes of the Maragoli are in major decline, and this has taken a toll on social norms of redistribution and reciprocity.

Bilateral sharing may have declined significantly among the Maragoli, but collective action has not. As mentioned, church groups are strong, as are Maragoli women's groups, which engage in a variety of predominantly

economic activities: farming a variety of vegetables (including French beans for sale), providing agricultural labor, zero-grazing dairy farming, keeping poultry, sewing and embroidery, beekeeping, basketry and pottery-making, new and used clothing businesses, and food cooking stores (kiosks). Women's groups also participate in rotating credit associations and extend loans to each other at insignificant interest rates to pay school fees and medical bills, build semipermanent or permanent rental rooms, buy roofing iron-sheets, and invest in fish and other small income-generating businesses. Some of them engage in choir activities for entertainment and hire themselves out to politicians and others to earn some money (for additional discussion about women's group activities in Maragoli, see Abwunza 1995; Makokha 1995; Mutoro 1997; Verma 2001).

THE ETHNOGRAPHIC CONTEXT OF SHARING AMONG THE GUSII

The Maragoli (Logoli) and the Gusii (also called the Abagusii or Kisii) share a common ethnic ancestry. Both are closely related to the Bantu-speaking Kikuyu, Meru, Akamba, Embu, Tende, and Kuria. According to Robert Ochieng (1974), the traditions of the Gusii people suggest that they originated from Misiri and were the same people as the Maragoli (Logoli), Kuria, and Suba. In their migration southward, overcrowding, epidemics, and drought led them to separate around Mount Elgon (Were 1967, 68). Linguists and historians have also noted linguistic, cultural, and traditional kinship between the Gusii, Maragoli, and Kuria. Careful reading of Gunter Wagner's (1970) book *The Bantu of Western Kenya, with Special Reference to the Vugusu and Logoli,* reveals similar kinship terms in both Gusii and Maragoli cultures. Some of these terms include “omwana” (a child of either sex in both cultures); “avako”/“abako” (Maragoli/Gusii kin terms for affinal relatives); “omukogoti”/“omokogoti” (Maragoli/Gusii kin terms for a last-born child of either sex); and “enyumba”/“enyomba” (Maragoli/Gusii kin terms for lineage). Shared linguistic origins and migration patterns suggest a common origin for the two societies.

The geographical home of the Gusii is Nyanza Province, approximately fifty kilometers east of Lake Victoria. The region lies in a highland equatorial climate. It receives rain almost throughout the year, with two major rainy seasons. The high and reliable rainfall supports food crops such

as finger-millet, bananas, avocados, maize, cassava, sorghum, yams, beans, peanuts, potatoes, tomatoes, onions, carrots, and cabbages. Coffee, pyrethrum, sugarcane, and tea are grown as cash crops. In addition, all households keep several high grade dairy livestock. Sheep, goats, chickens, and bees are also kept for domestic use and commercial purposes. Like the rest of Gusii territory, little uncultivated land remains in the study site. The most important economic resource, and therefore the basis of economic development, is the high-potential agricultural land; the very fertile soils and abundant rainfall that is well distributed throughout the year render the Nyansiongo settlement scheme one of the most productive areas in Gusiiland. The proportion of cultivable land ranges between 70 and 80 percent (Håkansson 1991). Brick-making is widespread, as are basketry, pottery-making, and the manufacture of lyres and other musical instruments. Two of the best-known Gusii crafts—favorites in the tourist trade—are soapstone carvings and the beaded “Kisii stool.”

Most Gusii live with population pressure comparable to that of the Maragoli. Like the Maragoli area, virtually every square inch of land in most of Gusii territory is used for cultivation and dairy farming; from this point of view, Gusii territory is one of the most “developed” agricultural areas in Kenya (Silberschmidt 1999). The Gusii also have extremely high educational attainment and out-migration, just like the Maragoli. By these measures, both groups have high market integration.

The Nyansiongo settlement scheme, the site for these experiments, is in Nyamira District, one of the Kenya highland areas in Gusiiland that was previously occupied by white farmers during the colonial era. After Kenya earned its independence, politically well-connected individuals were preferentially resettled in Nyansiongo after the white farmers vacated. The Nyansiongo settlement scheme is a high-potential agricultural area and relatively less densely populated than the rest of Gusiiland, which more closely resembles the situation in Maragoli.

Wilfred Subbo (2003) indicates that, overall, Gusii farmers in the Nyansiongo settlement have undergone significant socioeconomic transformations. They enjoy a higher standard of living than they did in the presettlement area. They now have larger pieces of land that they utilize in the production of more food and cash crops. Farmers in the Nyansiongo settlement scheme invest their income in both farming and nonfarming ventures. The resettled farmers have to a large extent adapted to the new

environment by leading lifestyles that tend to be urban-oriented (although they remain agrarian) and more individualistic. Farming has become a commercial activity. Most of the farmers in the Nyansiongo settlement scheme are classified as medium- to large-scale landholders; the largest parcel is two hundred acres (Omosa 1998). Many farmers in the Nyansiongo settlement scheme have great wealth accumulated from multiple sources. The fact that they are in a resettlement scheme means that neighbors are nonkin, and they have found new ways of building networks of support, such as the strong church and women's organizations.

Most Nyansiongo residents are Catholics and Seventh-Day Adventists. Membership in religious and nonreligious women's groups is highly valued, and the roots of women's groups (ebiombe) can be traced back to indigenous, gender-based labor groups that joined together for reciprocal labor on each other's farms. These group associations allow women autonomy and freedom to engage in their own economic investment and charity projects. Members provide crucial support in making wedding arrangements, carrying out initiation ceremonies, and coping during times of emergency, whether it is food shortage, major illness, or a business crisis. The groups are also a crucial source of extra labor at peak season, and they take care of urgent medical expenses when the support of men or husbands is not readily available. Women's groups also assist their members in establishing trading businesses, thus reducing women's dependence on men and high-interest bank loans. In fact, a good number of the maize mills in the area are owned and run by members of the women's groups. These associations are very popular in Nyansiongo because they encourage hard work via group effort and represent a way for members, the majority being women, to generate and save money outside their families. Their work on nonmembers' farms provides occasional wage labor for those not employed elsewhere.

Gift-giving is common among Gusii women's group members as a way of strengthening the bonds between them. Group members also use their network to identify trusted individuals to hire as agricultural laborers. The agricultural activities of women's groups include farming, poultry-keeping, fish-pod farming, dairy farming, zero-grazing, goat-keeping, firewood collection, charcoal, beekeeping, vegetable production and marketing, picking tea for pay, and napier grass production. Non-agricultural activities pursued by the women include paid and free choir performances, crafts,

embroidery, knitting, basketry, pottery-making, tailoring, brick-making, and revolving loans (rotating credit associations).

Despite their common ethnic heritage, the Gusii of Nyansiongo are different from the Maragoli in several important aspects. Unlike the Maragoli, whose neighbors are kin, the Gusii of Nyansiongo live among nonkin. The amount of land at the disposal of each family at the Nyansiongo settlement scheme (averaging 7.6 hectares among those who participated in the games) is significantly larger than the average of 0.2 hectares held by the Maragoli participants. The Gusii are wealthier and have higher individual income than the Maragoli; one sees evidence of this economic difference in the Gusii's hybrid-grade dairy livestock and the wide variety of crops they cultivate for sale. In addition, their environment is rarely prone to drought; they enjoyed a good agricultural year in 2004, when these games were played.

There are many similarities between the Maragoli and Gusii in their history of sharing norms. Like the Maragoli, the primary domestic unit among the Gusii is the patrilineal extended family homestead (enyomba/omochie). In the past, sharing was organized primarily during visits and ceremonies, including, for instance, funerals, weddings, bride-wealth negotiations, religious functions, initiation rites, and naming ceremonies. Those who failed to participate in sharing were usually ostracized and characterized as greedy. Thus, reciprocal sharing was always a virtue upheld by the Gusii, underpinning most social interactions and relationships.

Contemporary Gusii use sharing to overcome the worst effects of a risky market economy. Like the Maragoli, the Gusii are also organized around the principle of patrilineal descent. But given that the Gusii in this study have been resettled away from the bulk of their kin connections, they have been forced into new sharing networks (Orvis 1997). More nonkin are now beneficiaries of the Gusii sharing norms through their churches and women's groups.

For the wealthy and powerful, sharing provides a basis on which to build patronage for political, social, and economic purposes, although it can also drain resources away from more directly productive undertakings. For the highly vulnerable poor and the powerless, sharing serves as a safety net and slightly reduces the most extreme effects of poverty, although it does not fundamentally diminish socioeconomic stratification. The norms put

pressure on even the most powerful to try to appear to fulfill their obligations to share and assist their less fortunate neighbors and kin. Individuals and families who refuse to share are considered greedy (nyandamwamu), especially when others desperately need help. Sometimes hostilities arise in the form of witchcraft (oborogi) accusations directed at the wealthy individuals who are unwilling to share their good fortune with the less fortunate members of society (LeVine 1963; Orvis 1997).

METHODS

We selected three Maragoli villages (Elwanda, Givundimbuli, and Jemovo) for this study because of the significant distance between them, which diminished the chance of pollution in the games. With the help of village elders, one public meeting was held in each of the selected villages to explain the objectives of the study. Specific information about the games was not disclosed at this point, though villagers were told that they would be invited to play games involving real Kenyan shillings.

As described earlier, Maragoli villages are clan-territorial. The patriclan elder (ligulu) at the head of each clan is recommended by clan residents and approved by sublocation assistant chiefs prior to embarking on the informal administrative roles of the position. Each elder keeps a list of households in his area. We started by updating the lists shared with us by the village elders.

We conducted household socioeconomic and demographic surveys in every household in the selected villages prior to inviting individuals to play the games. It was made clear that participation in the study was voluntary and that individuals were free to pull out at any point.

Six Maragoli undergraduate research assistants (four female and two male) and two Maragoli PhD anthropologists (university lecturers) administered the surveys. The survey forms and game protocols were translated into the local Logoli language and explained carefully to ensure comprehension. The high level of formal education in the research site enhanced comprehension of the survey questions and ultimately of the game protocols. In general, people were very cooperative.

The TPG was conducted in the village of Elwanda, and the DG and UG in Jemovo and Givundimbuli. We drew a four-generation genealogy for each household in the selected villages and gathered socioeconomic and

demographic statistics for all household members on relationship to the head of household, age, sex, education, marital status, occupation, and income by source. Data pertaining to household wealth were also collected. The large number of households in each village made it impossible to ensure that at least one individual from each household participated in the games. However, no more than one individual player was drawn from any given household, and those who were invited to play were selected from a random sample of all household heads, with wives substituting in case of the absence of the husband. Given local norms, we could not avoid using the household heads if they were present and willing to play. People were invited to the game one day prior to play, and none of the invited households failed to send a player. Overall, people were very excited and eagerly looked forward to participating in these games and making some money during a time of severe food shortage.

Finding large and spacious rooms for the games was nearly impossible in the villages. Requests to use church premises to play games in Maragoli were declined in two villages; consequently, one game was played in a church and the other two games were run in high school buildings on weekends. This worked very well to provide ample space for running the games, isolating groups of players, and keeping curious, nonparticipating village members out of the venue.

The two native-speaking Maragoli university lecturers assisted in conducting the games with the help of the two university undergraduate research assistants, who interviewed the players at the end of each play. The research assistants conducted the postgame interviews in a separate room, while those who had completed their postgame interviews waited in another room.

Each of the game texts was back-translated by the two native-speaking Maragoli university lecturers, who served as senior assistants. One of them translated game texts into Logoli, and the other translated them back into English before seeing the original English text. Only extremely minor discrepancies in translation arose, and these were resolved with discussion.

One serious incident affected the play of the DG and the UG among the Maragoli in one of the two villages where these games were conducted. In this village, the players were asked to arrive at 9:00 AM, but some showed up as early as 7:00 AM. It was a rainy market day, and although the church venue had been booked and contracted in advance, the elderly members of

the church management committee, which oversaw the building, disagreed among themselves about how to share the fee paid for the use of the building. This disagreement contributed to a late start for the games because it delayed access to the building, which, combined with the very early arrival of some of the players, led to impatience midway through the games. In the course of play, a few players wanted to be paid prior to the completion of all games so that they could proceed to the market to buy some household items. In the end, they made the decision to stay for the remainder of the games and to be paid for all of them at the end, as required by the protocol. But there was clearly some unhappiness among some of the players in this village with how long the games were taking, and that may have affected their play in the UG. There were no similar delays in either the second DG/UG village or the village where the TPG was played. We return to this incident in the discussion of the experimental results.

All of the Maragoli games were played for a stake of 300 Kenyan shillings (approximately U.S.$4.62 in 2003), representing one day's minimum wage in Maragoli. Each player received 100 Kenyan shillings as a show-up fee at the beginning of the first game, but no additional show-up payment was made at the start of the second game.

The same players participated in the dictator game and the ultimatum game, and they played the same roles in each game, though they were paired with new partners. Game instructions were explained to the entire group, and all examples in the game protocols were used as illustrations to enhance comprehension. As soon as we were confident that the players understood the game, the players were left under the watchful eye of the research assistants, with strict instructions not to engage in any further discussion of the game. We wrote the names of individuals on pieces of paper, folded them, placed them in a bowl, randomly picked one at a time, and then invited each individual to come into the next room to play. Once the player was in the playing room, we explained the instructions again, using the examples listed in the game protocol to test for comprehension, and assigned the player his or her role. After the first play, players were moved to a third room to be kept isolated from those who had not yet played. The process was repeated for the second game. No payments were made until both games were completed.

We selected three distant Gusii villages (Ensakia, Matutu, and Nyandoche Ibere) to diminish the chances of pollution in the games. With

the help of village elders, one public meeting was held in each of the selected villages to explain the objectives of the study. Fine details about the games were not provided at this stage, though villagers were informed that they were going to play games involving real Kenyan shillings.

Gusii villages in the Nyansiongo settlement scheme are not organized along clan lines because settlers moved from different parts of the larger Gusii society. Villages are based on the arbitrary boundaries drawn by the assistant chief in consultation with the residents; villages are established for administrative convenience, and each is identified by major geographical features (rivers, valleys, hills) and headed by an omotureti (elder; “abatureti” in the plural). Villages are not permanent entities: they are subdivided whenever the membership becomes too large or when disagreements among residents necessitate a split in order to ensure peaceful coexistence. Each elder is recommended by residents of the administrative unit and approved by sublocation assistant chiefs and location chief prior to discharging their mandate. Elders are required to keep an updated list of households in the area. We started by updating the lists shared with us by the village elders.

As with the Maragoli, we conducted household socioeconomic and demographic surveys in every household before inviting individuals to play the games. We told invitees in advance that participation in the games was voluntary and that they were free to withdraw without any hard feelings on our part.

Six native-born Gusii postsecondary school research assistants (three female and three male) and one male university sociology graduate student helped with conducting the surveys and running the games in this site. The survey forms and game protocols were translated into the local Ekegusii language and explained carefully to ensure comprehension. The high level of formal education in the research site enhanced comprehension of the survey questions and ultimately of the game protocols. In general, people were very cooperative.

Again we gathered socioeconomic and demographic statistics for all household members—relationship to head of household, age, sex, education, marital status, occupation, and income by source—as well as data pertaining to household wealth. We assigned random numbers to each household and randomly drew numbers to invite households to participate in the games. Wives need their husband's consent to attend such events; in

this case, partly out of curiosity, husbands (when present) often opted to represent their household. When husbands were not present—either because the household was female-headed or because the male household head was absent for off-farm business or employment—women were sent instead.

Invitations were made one day prior to play, to minimize pollution, and the games were conducted at one Catholic and two Seventh-Day Adventist churches. These structures gave us plenty of space to run the games and isolate groups of players. Keeping non-invited people off the premises was also very easy, as they tended to keep off church premises when requested to do so.

One native Ekegusii-speaking assistant conducted the games with me, and the sociology graduate student interviewed the players at the end of each play. Two assistants conducted postgame interviews in a separate room, while those who had completed their postgame interviews waited in another room under the watchful eye of another assistant.

Each of the game texts was back-translated by the research assistants. Two of them translated the text into Ekegusii, and another pair translated it back into English before seeing the original English text. Only insignificant discrepancies in translation were noticed, and we managed to iron them out in an open discussion among the entire research team.

Each player received 100 Kenyan shillings as a show-up fee at the beginning of the first game, but no additional show-up payment was made at the start of the second game. The same players participated in the DG and the UG and played the same roles in each game, though they were paired with new partners. Game instructions were explained to the entire group, and all examples in the game protocols were used as illustrations to enhance comprehension. As soon as we were confident that the players understood the game, they were left under the supervision of the research assistants and given strict instructions not to discuss the game any further. We wrote the names of individuals on pieces of paper, folded them, placed them in a bowl, randomly picked one at a time, and invited the individual selected to come into the next room to play. Once the player was in the playing room, we explained the instructions again using the examples listed in the game protocol to test for comprehension, and assigned the player a role. After the first play, the player was moved to a third room to be kept isolated from those who had not yet played. The process was repeated for the second game. No payments were made until both games were completed.

Among the Gusii, the stake size was reset to 1,000 Kenyan shillings (approximately U.S.$14.28 in 2004) to reflect the higher standard of living and wage rates in this wealthy area. There were no deviations from the standard protocol. In the processing of the experimental results, however, the household size data for Gusii were inadvertently overwritten, and the analyses presented here use the number of children for both societies instead of household size.

POPULATION DEMOGRAPHICS AND MARKET INTEGRATION

Many of the socioeconomic differences between the Maragoli and Gusii subject populations described here are easily grasped in table 12.1 and in the histograms in figures 12.1 to 12.7.

There is nothing remarkably different about the age distribution, sex distribution, educational attainment (slightly higher for Maragoli), number of children (higher for Gusii), or village size that differentiates the Maragoli players from the Gusii players. But the economic differences between the two populations stand out. Whatever variable we consider: land holdings, livestock holdings, income, wealth, wage labor, or percentage of land in cash crops, the Gusii players were far better endowed than their close ethnic relatives, the Maragoli. This difference is particularly dramatic in figure 12.6, in which we see that the wealth distribution of the two societies barely overlaps, making the richest Maragoli equivalent to the poorest Gusii. It is also notable that while 53 percent of the Maragoli had no wage work whatsoever, only 22 percent of the Gusii had no wage work, and among the Gusii, women (78.8 percent) were equally as likely as men (75.7 percent) to have wage work, while the Maragoli women (30.8 percent) were only half as likely as men (61.3 percent) to have wage work.

Despite the relative poverty of the Maragoli, they share with the Gusii many of the attributes that we associate with a highly developed market economy: high rates of secondary school education, a long history of cash-cropping, and out-migration to urban centers for wage work. One must bear in mind when examining these player demographics that they are not representative of the Maragoli and Gusii populations as a whole, but rather, of those who have remained on the land in these rural farming communities while many household members are absent in the towns.

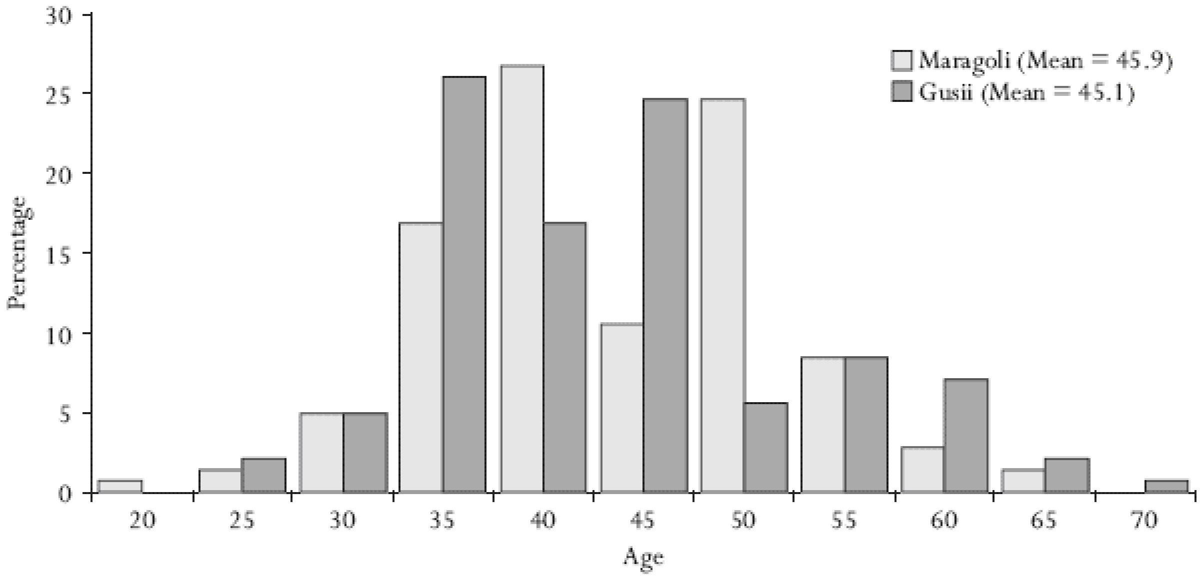
Given the obvious signs of considerable interaction in the market economy, it is surprising to see such low mean measures of our primary market orientation variable (percentage of diet purchased in the market) for these two societies: 43 percent for the Maragoli, and 28 percent for the Gusii. In both cases, the low market integration is a function of their reliance on home food production, and in this sense, it correctly captures the fact that these individuals are rural residents still tied in many ways to their rural roots and values. Even the Gusii, who are also major cash-crop producers—to which they devote 37 percent of their ample holdings—still consume home farm produce, which explains how such developed farmers wind up with so low a score by this measure of market integration. Because of the more ample land holdings of the Gusii relative to the Maragoli, and perhaps also because of the Maragoli's depressed production due to drought for the year they were surveyed, we find the Marigoli ranked higher in market integration than the Gusii.

TABLE 12.1 *Demographic Differences Between Maragoli and Gusii Players*

	Maragoli (Mean) N = 140	Gusii (Mean) N = 140	Maragoli Standard Deviation (for Continuous Variables)	Gusii Standard Deviation (for Continuous Variables)	Wilcoxon Difference of Means
Market integration (percentage of calories purchased)	42.9	28.0	8.62	5.12	0.000***
Age	45.9	45.1	8.38	9.70	0.204
Female percentage (dummy)	46.4	47.1			0.905
Education in years	12.5	11.9	1.20	2.55	0.011**
Number of children	6.1	6.8	1.76	2.07	0.008**
Village population	3,843.0	4,063.0	1,148.00	727.00	0.729
Income (in U.S. dollars)	1,193.0	1,520.0	494.00	675.00	0.000***
Wealth (in U.S. dollars)	1,951.0	6,008.0	373.00	1,357.00	0.000***
Land (in hectares)	0.2	7.6	0.08	1.73	0.000***
Livestock	2.8	4.1	0.88	0.83	0.000***
Wage labor (days per month)	11.5	18.4	12.41	10.76	0.000***
Wage labor (percentage of men with some wage)	61.3	75.7			0.061*
Wage labor (percentage of women with some wage)	30.8	78.8			0.000***
Percentage of land in cash crops	3.9	36.7	3.33	6.45	0.000***

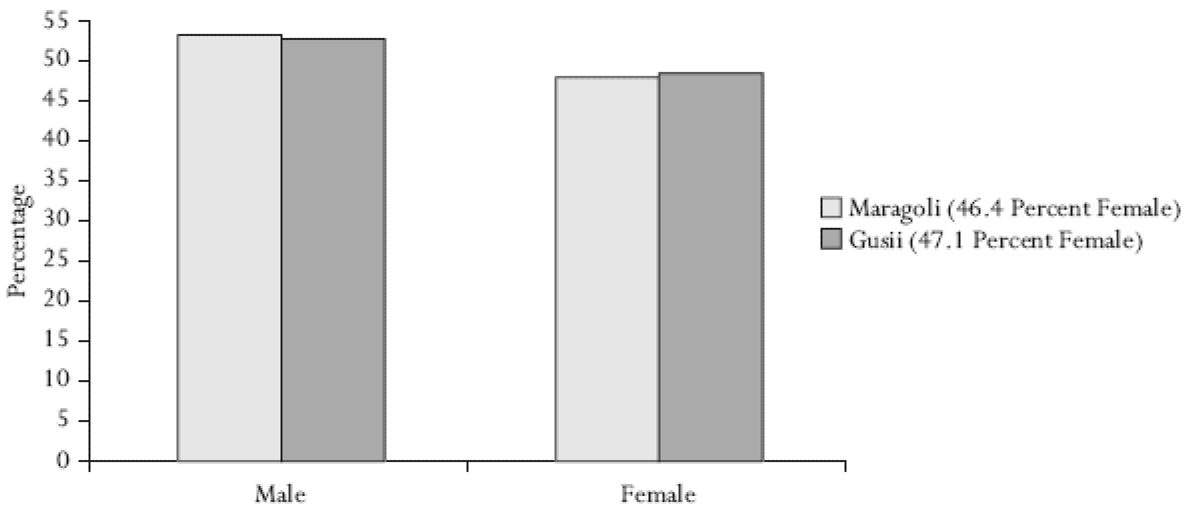
Source: Author's calculations based on author data.
$*p < 0.1$; $**p < 0.05$; $***p < 0.01$

FIGURE 12.1 *Maragoli and Gusii Players' Age Distribution*



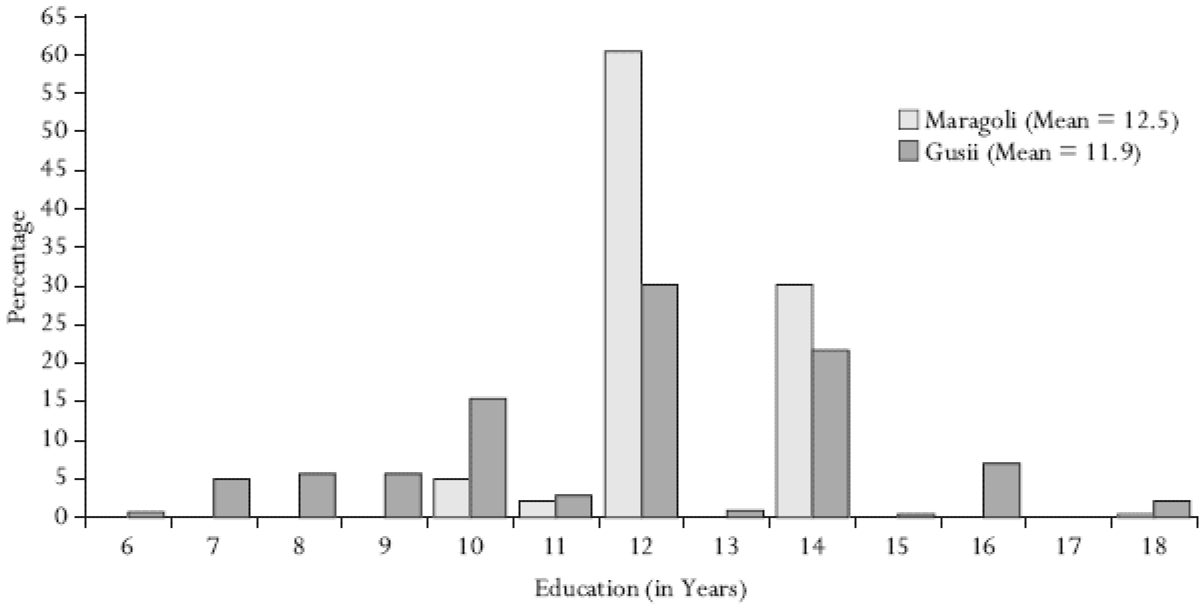
Source: Author's calculations based on author data.

FIGURE 12.2 *Maragoli and Gusii Players' Sex Distribution*



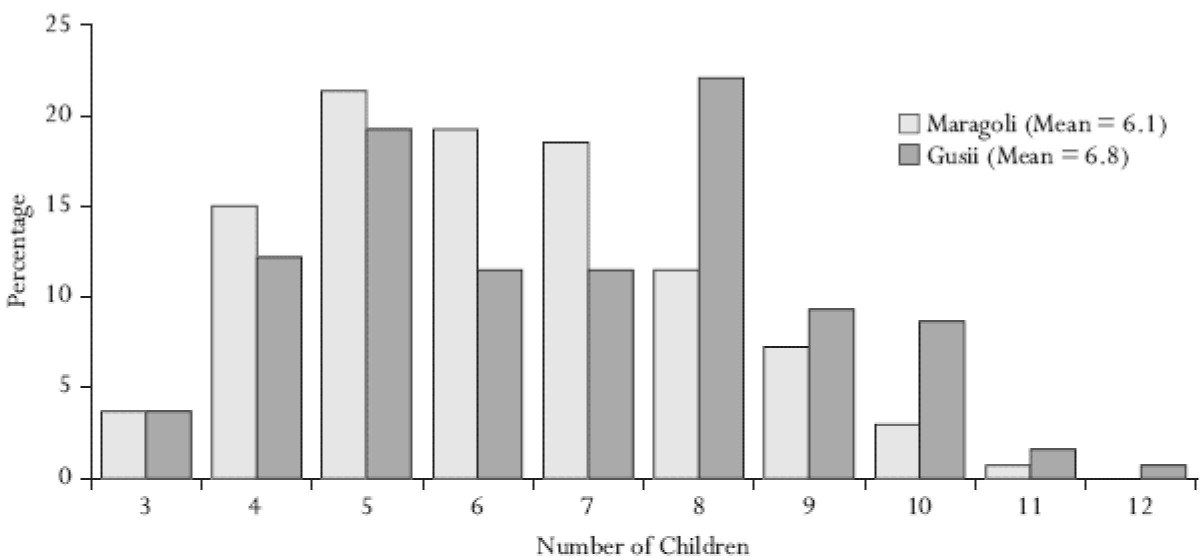
Source: Author's calculations based on author data.

FIGURE 12.3 *Maragoli and Gusii Players' Education*



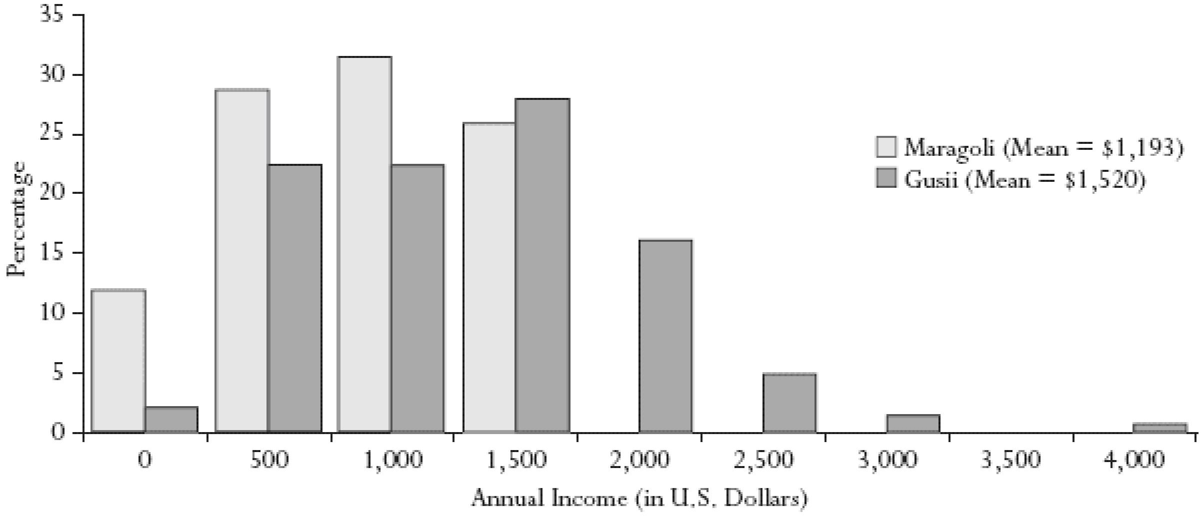
Source: Author's calculations based on author data.

FIGURE 12.4 *Maragoli and Gusii Players' Number of Children*



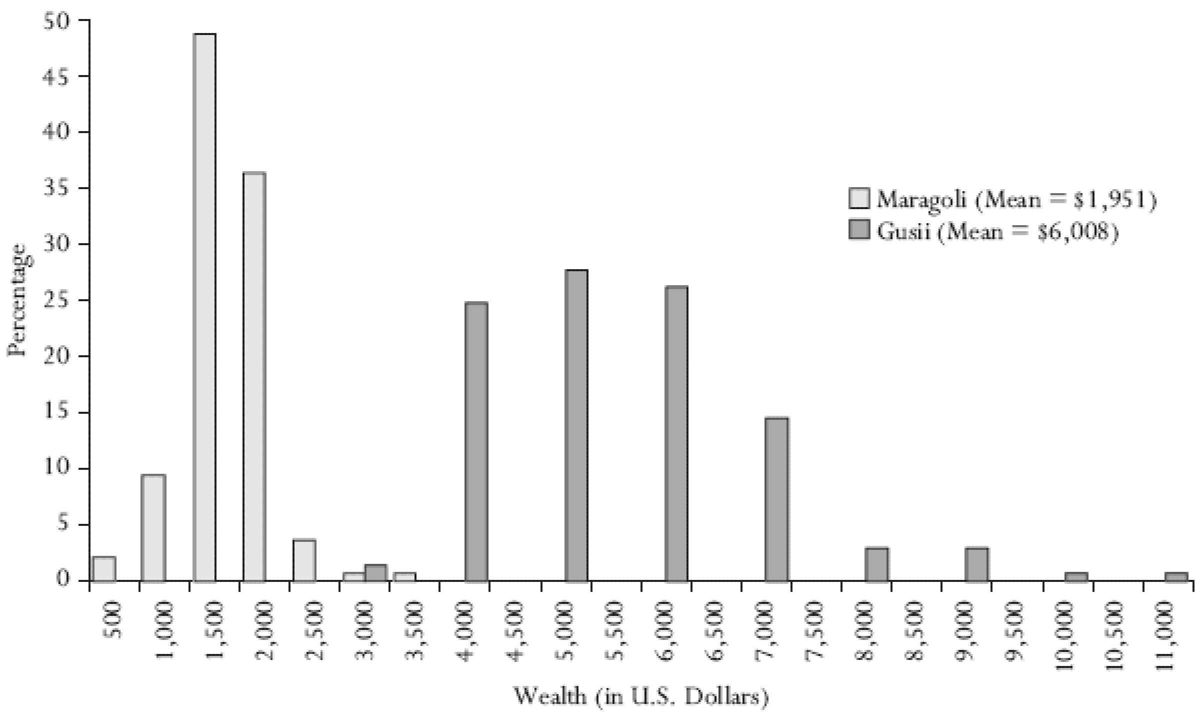
Source: Author's calculations based on author data.

FIGURE 12.5 *Maragoli and Gusii Players' Annual Income*



Source: Author's calculations based on author data.

FIGURE 12.6 *Maragoli and Gusii Players' Wealth*



Source: Author's calculations based on author data.

FIGURE 12.7 *Maragoli and Gusii Players' Wage Labor*

Source: Author's calculations based on author data.

RESULTS

Here we summarize the results of the DG, UG, and TPG offers and the punishment behavior in the UG and the TPG. The results for both societies are discussed together for each game.

Dictator and Ultimatum Game Offers

Figures 12.8 and 12.9 present the data on offers in the DG for the Maragoli and the Gusii, respectively. While the means for the two populations are not significantly different, the distributions are strikingly so. The Gusii show one of the tightest distributions that we see in the overall sample. The Maragoli have highly dispersed offers and are remarkable for the four hyper-fair offers at 60 percent, all of which came from women. When asked in the postgame interview to explain why they played the way they did, these four replied: "Always good to give more," "Just wanted to be generous," "In order to be blessed," and "To benefit others." These answers are consistent with people who intentionally gave more than 50 percent.

Figures 12.10 and 12.11 present the data for player 1 offers in the UG. Once again, we find that there is remarkably low variance in the Gusii UG

offers, as was the case with their DG offers, though the mean has shifted upward. Although the Gusii distribution for both games is unusually homogeneous, there is nothing particularly unusual about the movement of the mean moderately upward in the UG.

The Maragoli UG offers exhibit the same high variance as their DG offers, but the mean has shifted markedly downward, which is highly unusual and requires some deliberation. In the DG, there were four players who made hyper-fair offers of 60 percent. In the UG, those same players reduced their offers to 10, 20, 30, and 40, yielding DG/UG game means of 35, 40, 45, and 50. We reported earlier that their postgame explanations for these offers emphasized the value of generosity. In contrast, their postgame explanations for their much lower offers in the UG showed a different motivation: the player who switched to 10 said that she "needed money to buy things"; the one who switched to 20 said, "Guess I thought about my needs"; the one who switched to 30 said, "I felt I should keep more;" and the one who switched to 40 said of her offer in the DG, "I was being generous." Given that the norm in the DG was about 35 percent, the average play of these players was still on the high side of the DG mean if we average over both games.

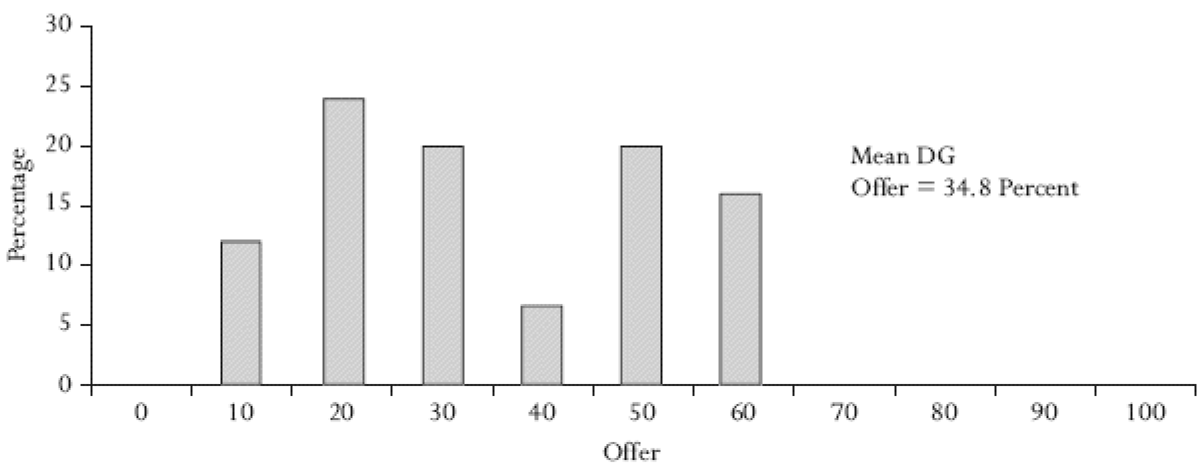
Figure 12.12 offers some insight into to the pattern of play at the individual level among the Maragoli. It shows their DG offer (lighter bar) followed by their UG offer (darker bar) so that we can see which way individual players were moving.

Figure 12.12 gives us some evidence that players tended to use their UG offer to move the mean of their DG/UG offers closer to the group DG mean (35 percent): sixteen of the twenty-five players (64 percent) used their UG offer to move the average of their DG/UG play in the direction of the DG mean. We find that seven of the players who were below the DG mean (in table 12.12, numbers 2, 3, 5, 6, 7, 8, and 9) increased their UG offer. Of the high DG players, nine reduced their UG offer to move closer to the DG mean (numbers 16, 17, 18, 19, 20, 22, 23, 24, and 25). Only five players changed their offer to move away from the DG mean, while four players played the same in the DG and the UG.

Why so much movement among the Maragoli players in the DG and the UG? Recall from the discussion of the game logistics that in one village there was a long delay in start time for the players, who got impatient during the period between the DG and the UG. Most of the drop in the

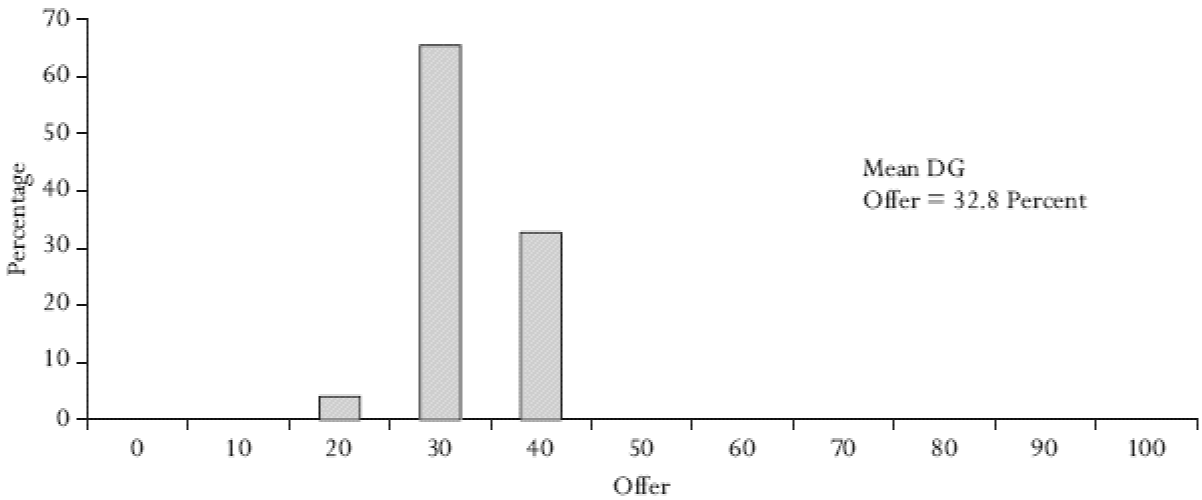
mean between the DG and the UG came from this village. For these ten players, the DG mean was 45, considerably higher than the mean for the two villages that played, which was 34.8. The UG mean dropped to 23 in this village, even lower than the overall UG mean of 25.2. It is impossible to know exactly what drove these wild swings in individual behavior in this one village. All four of the hyper-fair DG offers of 60 percent were also in this village. It is possible that the delayed start to the games angered the players to the point that they felt entitled to more resources by the time they played the UG and thus reconsidered their generous behavior in the DG, which appears to have exceeded the local norm. Only one out of ten players in the village that had a delayed start increased their offer in the UG, while seven out of fifteen players from the other village did so.

FIGURE 12.8 *Maragoli Dictator Game Offers (N = 25)*



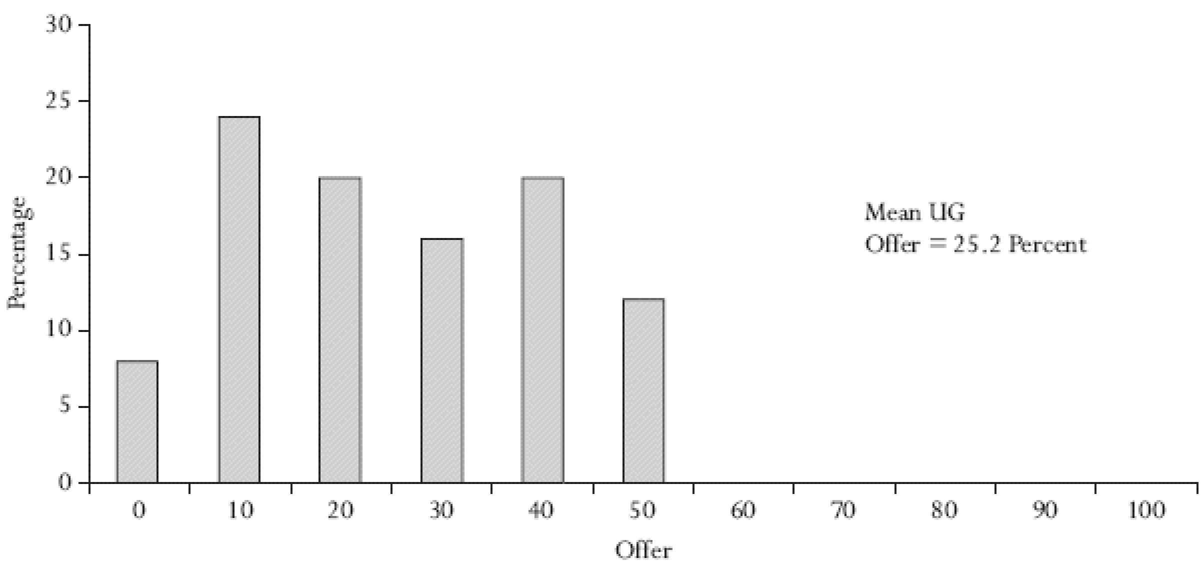
Source: Author's calculations based on author data.

FIGURE 12.9 *Gusii Dictator Game Offers (N = 25)*



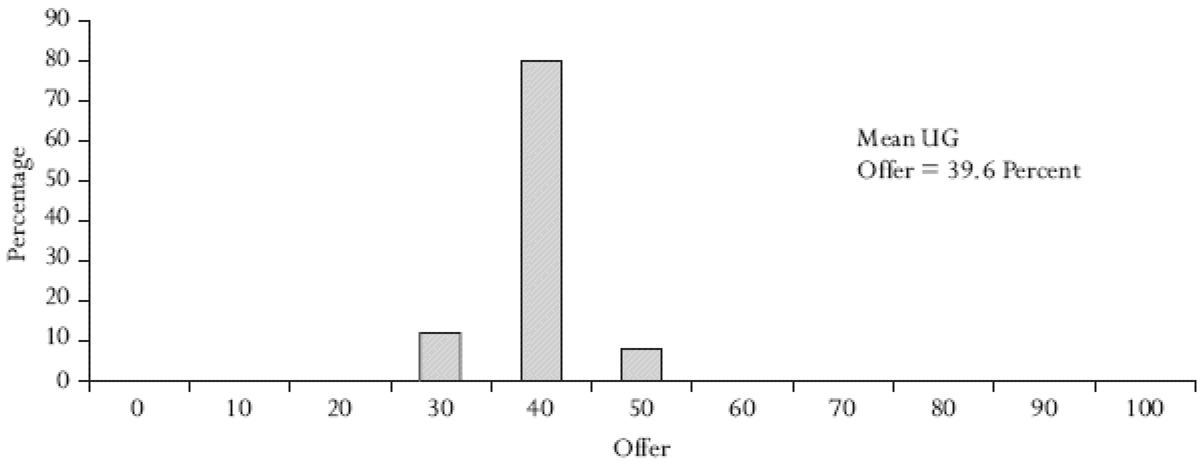
Source: Author's calculations based on author data.

FIGURE 12.10 *Maragoli Ultimatum Game Offers (N = 25)*



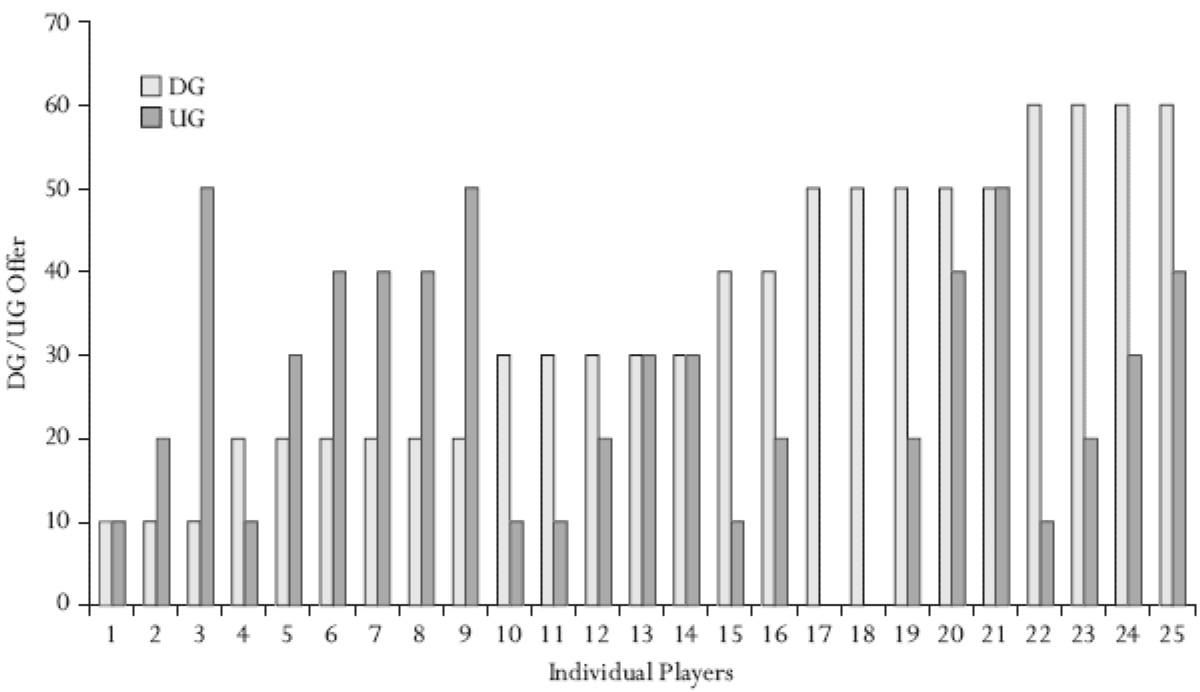
Source: Author's calculations based on author data.

FIGURE 12.11 *Gusii Ultimatum Game Offers (N = 25)*



Source: Author's calculations based on author data.

FIGURE 12.12 *Dictator Game and Ultimatum Game Offers by Individual Maragoli Players*



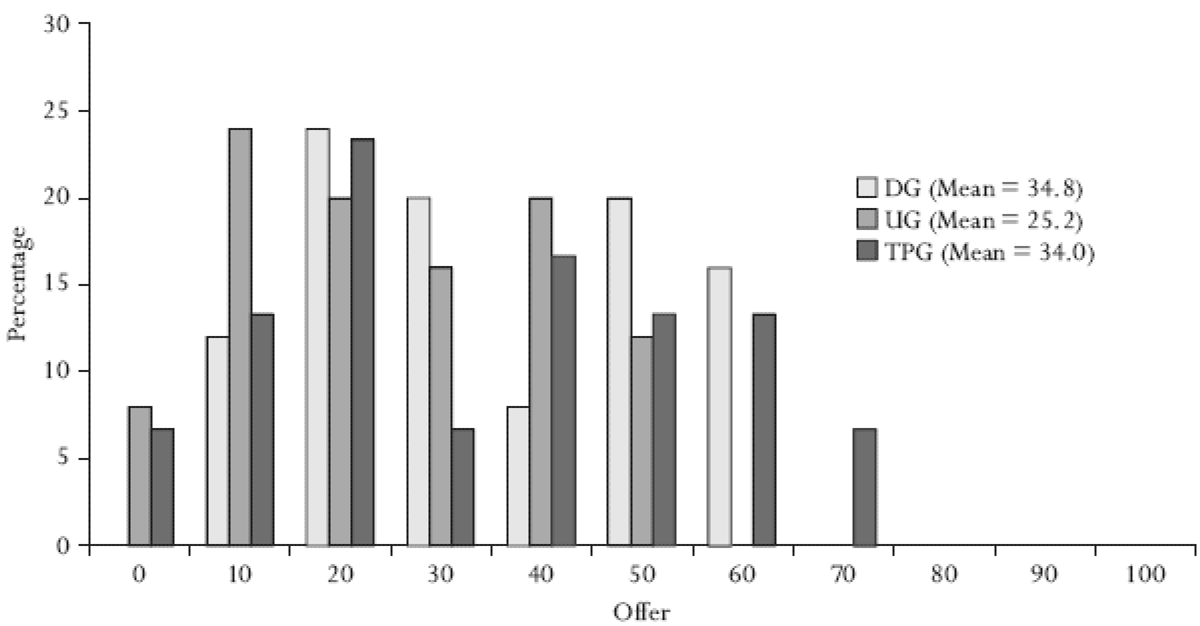
Source: Author's calculations based on author data.

Third-Party Punishment Game Offers

The TPG was run in a different village from the DG and UG among both the Maragoli and the Gusii. Figures 12.13 and 12.14 show the TPG offers alongside the DG and UG offers for each society.

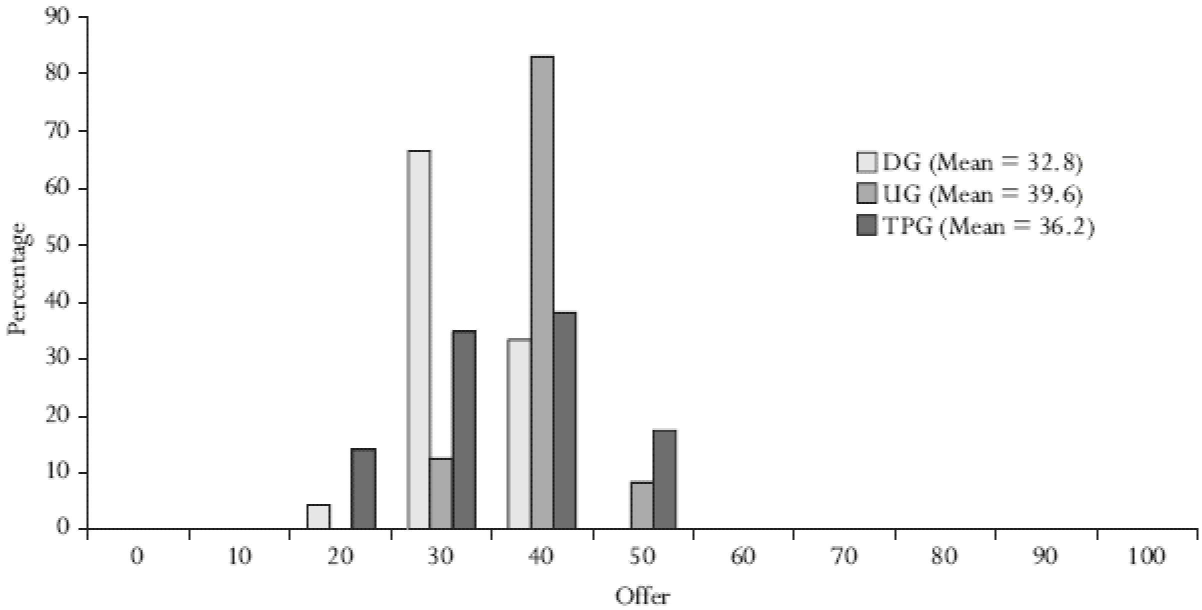
The most striking characteristic of the TPG offers among the Maragoli is the presence of hyper-fair offers; four made offers of 60 percent, and two made offers of 70 percent. Hyper-fair offers in the TPG are extremely unusual. Their responses in the postgame interviews to the question of why they played the way they did give some insight into their thinking: “Good to be generous in order to be blessed”; “Sharing with others generously is very rewarding”; “I felt like the other person might need more money than me”; “I think I was very generous”; “Those who give more are blessed more in other ways”; and “Did not feel as needy as my neighbors.” These responses are consistent with people who intentionally gave more than a “fair” offer (defined as 50 percent), and they reflect the heavy influence of religion, which is consistent with the deep religious convictions of the area.

FIGURE 12.13 *Maragoli Offers in the Dictator Game, the Ultimatum Game, and the Third-Party Punishment Game*



Source: Author’s calculations based on author data.

FIGURE 12.14 *Gusii Offers in the Dictator Game, the Ultimatum Game, and the Third-Party Punishment Game*



Source: Author's calculations based on author data.

Among the Gusii, we find a more dispersed distribution of offers than was the case for Gusii offers in both the DG and the UG, and the mean falls slightly from the UG, which is also typical. We turn now to the rejection data for the UG and the TPG.

Punishment Behavior in the Ultimatum Game and the Third-Party Punishment Game

In figures 12.15 and 12.16, we find the expected income for each offer level based on the rejection data for each society. In the darker bars, we have plotted the mean rejection data from player 2s in the UG who said that they would reject a given offer level. In the lighter bars, we have plotted the mean fining data from player 3s in the TPG who said that that they would use 20 percent of the stake to fine player 1 for that offer to player 2. The lines on the graph represent the expected income derived by calculating the probability of rejection at that offer level.

The most striking thing about the Maragoli rejection behavior is the almost unprecedented fining in the TPG of 50 percent offers (six

individuals) and one 60 percent offer. The data raise the possibility that the players did not understand the game, but all of them passed the game test questions, and given the very high education level of this society, lack of understanding seems like an unlikely explanation. One possibility is that the participants were effectively "opting out" of the play. Of the seven individuals involved, their responses to the question "What did this game remind you of in real life?" reveal some evidence of this. Two of the players replied that the game reminded them of "gambling," and another player responded, "Discourage dependence on free things." In this religiously conservative Quaker society, such responses may have meant that the player was opting out. Two others replied that the game made them think of "being grateful and sharing what you have," and the other two responses were, "How poverty makes us not share," and, "Not willing to share even free money." At least three of these responses communicate strong disapproval and may be consistent with people who were using their behavior to express disapproval of the game.

The Maragoli did not come close to hitting the income-maximizing offer (IMO) in either the UG or the TPG. In the UG, only 20 percent of offers matched the IMO of 40. In the TPG, only 7 percent of offers matched the IMO of 0. Among the Gusii, fully 80 percent of UG offers were right on the IMO of 40. For the Gusii, however, the IMO for the TPG was 50 percent, and only 18 percent of Gusii offers were this high. With the exception of Gusii behavior in the UG, it appears that both societies have a higher preference for prosocial punishment than they do for prosocial offers. For example, while 80 percent of Maragoli player 2s in the UG punished 20 percent or less, 52 percent of Maragoli UG offers were of 20 percent or less.

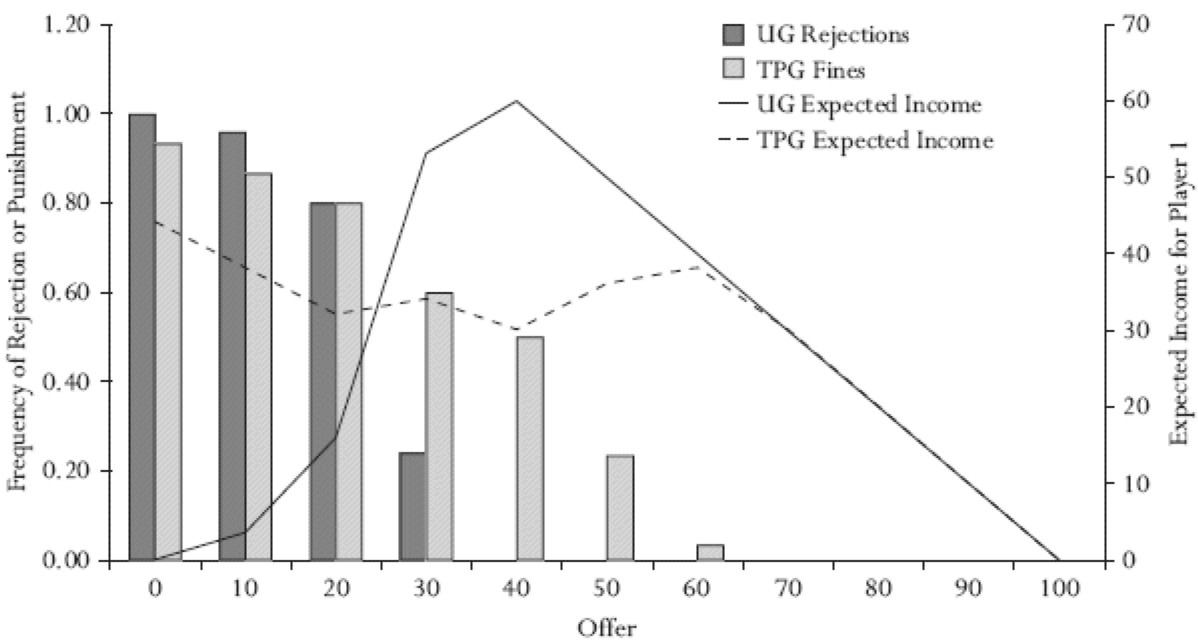
Examining Within-Group Variation in Regression Analyses

In this section, we examine each of the offers (in the DG, UG, and TPG) as the dependent variable in a regression model, while investigating the predictive power of six socioeconomic variables that could be expected to have an impact on player behavior: age, sex, education, income, wealth, and number of children.

The within-society variation revealed in the regression results is not consistent across sites, but it may be connected to the significant economic differences between the societies reported earlier. Among the Maragoli,

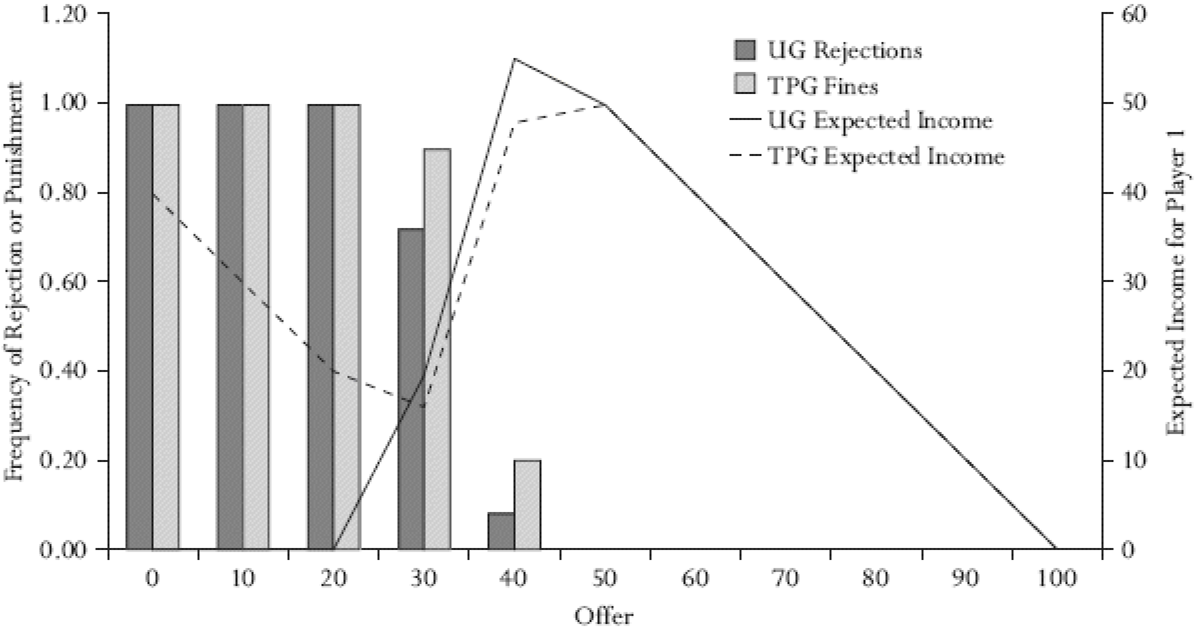
who faced significantly dire economic circumstances at the time of these games due to drought, we find that wealth was positively correlated with DG offers and carried a high coefficient. For every additional U.S.$1,000 in wealth, DG offers increased by 9 (see table 12.2). Children were negatively correlated with DG offers, and this may reflect the fact that those with more mouths to feed felt pressed in bad times to make low offers and reserve more for their children. Several players mentioned economic need in their postgame explanations for why they played the way they did; those who offered 10 or 20 percent responded: "Needed the money"; "Need most of the money to buy food"; "I badly needed all the cash"; "Needed most of the money for personal use"; "Got it first, hence should keep more"; "Fair amount, as I needed the money"; "I needed most of the money to buy some things"; "Always good to share free things"; and "Needed more of the cash." All but two of these seven explanations emphasize economic need, consistent with the dire times for the Maragoli at that moment.

FIGURE 12.15 *Maragoli Expected Income in the Ultimatum Game and the Third-Party Punishment Game*



Source: Author's calculations based on author data.

FIGURE 12.16 *Gusii Expected Income in the Ultimatum Game and the Third-Party Punishment Game*



Source: Author's calculations based on author data.

TABLE 12.2 *Linear Regressions of Dictator Game Offers for the Maragoli and the Gusii*

	Maragoli (1)	Maragoli (2)	Gusii (1)	Gusii (2)
Age	0.781		−0.118	
	(0.414)*		(0.152)	
Female (dummy)	9.267		−4.265	
	(8.346)		(2.423)*	
Education	−0.701		−0.519	
	(1.892)		(0.429)	
Income (U.S. $1,000)	−7.220		6.148	
	(9.900)		(2.189)***	
Wealth (U.S. $1,000)	12.503	9.182	−4.570	−1.800
	(5.186)**	(4.981)*	(0.940)***	(0.654)***
Children	−8.018	−5.198	0.468	
	(2.417)***	(1.962)**	(0.603)	
Constant	33.347	49.627	63.719	44.821
	(34.775)	(14.716)***	(11.141)***	(4.466)***
Observations	25	25	25	25
Adjusted R-squared	0.329**	0.184**	0.498***	0.253***

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level
**significant at 5 percent level
***significant at 1 percent level

The Gusii made highly homogeneous offers across all games, so we did not expect that much would turn up when we examined within-society variation. As discussed earlier, the Gusii are far better endowed economically than the Maragoli, and they also played the games during a normal economic year, as opposed to the drought year when the Maragoli played. Among the Gusii, we find the opposite impact of wealth on offers, though the size of the coefficient (1.8) is much lower (table 12.2). Although income is highly positively significant in model 1 for the Gusii, it is not robust, and it drops from significance once other insignificant variables are removed from the regression. The same is true for gender, with women making lower offers than men, but when the insignificant controls are dropped, the effect disappears. We revisit this in the discussion of the combined DG/UG offers. Inclusion of the DG offer as a predictor in the UG regression did not yield a significant result.

Unfortunately, the regression analysis for the Maragoli UG yields no significant results or clues that might shed light on the mysterious drop in offers from the DG (table 12.3). Similarly, given the low variation in offers

among the Gusii, we did not expect to find highly significant within-society variation, and we did not. The statistical significance on the result for women's lower offers disappears when the other insignificant variables are dropped from the model.

TABLE 12.3 *Linear Regressions of Ultimatum Game Offers for the Maragoli and the Gusii*

	Maragoli (1)	Gusii (1)
Age	–0.355	0.229
	(0.521)	(0.135)
Female (dummy)	4.008	–3.644
	(7.512)	(1.937)*
Education	2.799	0.108
	(2.605)	(0.449)
Income (U.S. $1,000)	9.277	1.554
	(12.821)	(2.164)
Wealth (U.S. $1,000)	–4.614	–1.648
	(7.496)	(1.122)
Children	0.452	–0.891
	(3.245)	(0.556)
Constant	4.221	43.991
	(40.04)	(9.487)
Observations	25	25
Adjusted R-squared	0.157	0.339

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level

Given the problems encountered in the DG and UG among the Maragoli and the suspicion that playing the UG after the DG may have affected player 1s' UG offers in the second game as a result of the delayed start in one village, here we combine the offers from both the DG and the UG to consider whether the Maragoli were playing to average their offers across both the DG and the UG (table 12.4).

In this combined analysis, we confirm the effect of children in depressing offers among the Maragoli, as discussed earlier, and the effect of both gender and wealth in depressing Gusii offers. The lower offers among Gusii women are more clearly demonstrated in the combined DG/UG analysis than they were earlier. The female Gusii players indicated that they would donate their earnings from participating in the games to their women's groups. Their ultimate goal was to raise enough funds to build and equip a milk cooling plant for use by members and nonmembers for a

nominal fee, especially when poor road conditions made the daily collection of milk impossible. Some of the Gusii explained that they were conservative in their offers in order to save cash for their women's group contributions. The amount of cash they contributed to their group accounts influenced the bank loans approved for them by Equity Bank, Family Bank, and Cooperative Bank (large banks with branches across the country). In the long run, they believed that they gained more by channeling funds to their women groups. Further, the intentions of the very wealthy may not be what they appear. Although wealth was negatively correlated with offers, the richer Gusii women are more commonly members of women's charity groups; if they were committed to redirecting their earnings to charity, they may have had no compunction about taking more in the game. Unlike the poorer women, they did not plan on keeping their earnings for their personal use. For the wealthy Gusii, participation was viewed as fun rather than as an opportunity for individual personal financial gain.

The regression results for the TPG offers do not fall in line with any of the DG or UG results. The negative correlation between offer and education for the Maragoli is strong, but it is not robustly supported by other games. Among the Gusii, the income result disappears when the other insignificant variables are dropped from the model (table 12.5).

TABLE 12.4 *Linear Regressions of Combined Dictator Game and Ultimatum Game Offers for the Maragoli and the Gusii*

	Maragoli (1)	Maragoli (2)	Gusii (1)	Gusii (2)
Age	0.213		0.056	
	(0.289)		(0.113)	
Female (dummy)	6.638		−3.955	−2.779
	(4.692)		(1.621)**	(1.420)*
Education	1.049		−0.205	
	(1.406)		(0.372)	
Income (U.S. $1,000)	1.029		3.851	
	(8.444)		(1.874)*	
Wealth (U.S. $1,000)	3.945		−3.109	−1.561
	(3.873)		(0.882)***	(0.508)***
Children	−3.783	−2.274	−0.212	
	(1.642)**	(1.282)*	(0.474)	
Constant	18.784	43.737	53.855	
	(23.905)	(8.118)***	(8.456)***	
Observations	25	25	25	25
Adjusted R-squared	0.225	0.109*	0.474***	0.349***

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level
**significant at 5 percent level
***significant at 1 percent level

TABLE 12.5 *Linear Regressions of Third-Party Punishment Game Offers for the Maragoli and the Gusii*

	Maragoli (1)	Maragoli (2)	Gusii (1)
Age	–0.104		–0.062
	(0.722)		(0.487)
Female (dummy)	–0.315		0.563
	(9.964)		(3.842)
Education	–9.862	–7.500	0.756
	(4.781)**	(3.554)**	(1.158)
Income (U.S. $1,000)	5.397		–7.540*
	(12.810)		(3.824)
Wealth (U.S. $1,000)	–15.700		1.877
	(22.717)		(1.822)
Children	2.026		0.760
	(3.031)		(1.604)
Constant	176.476	130.000	23.323
	(89.586)	(46.224)***	(24.020)
Observations	30	30	30
Adjusted R-squared	0.178	0.129**	0.103

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level
**significant at 5 percent level
***significant at 1 percent level

Examining Prosocial Punishment Behavior

The most dramatic finding in this set of games is the degree to which the Maragoli and the Gusii engage in prosocial punishment behavior in both the UG and the TPG. We can measure this by calculating the mean offer that is the minimum acceptable offer (MinAO) to player 2s in the UG (no rejection) and player 3s in the TPG (no fining). Both societies have the highest MinAOs of all societies in our cross-cultural sample. On the UG, it is 30 for the Maragoli and 38 for the Gusii. On the TPG, it is 40 for the Maragoli and 41 for the Gusii. Even if we throw out the seven highly unusual cases of fining of fair and hyper-fair TPG offers among the Maragoli, they still average an MinAO of 33. Unfortunately, the regression analyses (tables 12.6 and 12.7) offer little insight into what is going on.

Recall that both the Maragoli and the Gusii are highly religious, and that church and women's groups are active in an amazing array of successful economic and cooperative endeavors. I have argued that the existence of

these groups may have suppressed offers in all three games because women and the rich may have preferred to donate their winnings to these highly effective groups rather than give high offers in the games. But then why the high prosocial punishment? One possible explanation is that societies that have become so successful in collective action and sustained settlement in large villages depend on strong internalized norms for punishing free riders. The Maragoli and the Gusii have the highest village size of any of our populations, and this is the key variable that correlates with high punishment in our cross-cultural sample. If this is the case, then players may have brought this punishment norm into the game and used it extremely aggressively. What we cannot explain from the data is why the offer levels were so out of synch with the aggressive punishment.

CONCLUSIONS

The Maragoli and the Gusii represent modern farmers in Africa: they are highly educated, and they have high rates of migration off the farms and into urban centers for employment. They share common ethnic ancestors, but differed significantly in their economic circumstances at the time of these experiments. The Maragoli, with their tiny plots of land, were severely economically stressed from drought at the time of the experiments. Not only do the Gusii have significant land holdings and considerable on- and off-farm investments, but they were enjoying a normal agricultural season at the time of the experiments. Both societies are deeply religious and participate in a broad range of successful commercial and charitable cooperative groups.

In the DG and UG offers among the Maragoli, we find evidence that is consistent with their dire economic circumstances. The only significant variable in the regressions is the number of children, which is negatively correlated with offers. Those who had more mouths to feed may have felt a need to take more money from the games. Further support for this thesis comes from the postgame interviews, in which many respondents mentioned economic need.

Among the economically secure Gusii, we find a different pattern. Women and the rich were less generous than others in the combined DG/UG offers. Although this is post hoc reasoning, one plausible explanation is that these rich women who were heavily invested in highly

successful church and charity women's groups may have preferred to retain their earnings and invest them in these groups, where they had a chance to multiply the benefits and contribute even more to charity. That explanation is consistent with statements from the women participants regarding their plans.

The most interesting findings from the Maragoli and Gusii games are the dramatically high levels of prosocial punishment among both groups for both the UG and the TPG. They were the highest punishers among our cross-cultural sample. Though speculative, one explanation for this strong punishment behavior could be that it stems from a religious tradition that emphasizes punishment for one's bad behavior combined with a common experience with successful collective action. The assumption here is that successful collective action depends on predictable punishment of free riders. It is a plausible hypothesis that both the Maragoli and the Gusii took this social norm into the games with them and carried out their punishment roles in the UG and the TPG with extra vigor. It is also the case that the Maragoli and the Gusii have the highest mean village sizes in our sample, and this variable is strongly correlated with TPG punishment across the project.

TABLE 12.6 *Linear Regressions of Minimum Acceptable Offers in the Ultimatum Game for the Maragoli and the Gusii*

	Maragoli (1)	Gusii (1)	Gusii (2)
Age	0.104	0.071	
	(0.249)	(0.359)	
Female (dummy)	1.357	2.543	
	(4.179)	(3.143)	
Education	0.503	0.826	0.741
	(2.593)	(0.650)	(0.407)*
Income (U.S. $1,000)	−1.762	−1.833	
	(9.359)	(3.162)	
Wealth (U.S. $1,000)	7.599	−0.416	−1.404
	(8.821)	(1.501)	(0.546)**
Children	1.291	−0.312	
	(1.638)	(1.099)	
Constant	−1.467	31.467	38.024
	(30.721)	(17.077)*	(5.688)***
Observations	25	25	25
Adjusted R-squared	0.157	0.292	0.233 **

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level
**significant at 5 percent level
***significant at 1 percent level

TABLE 12.7 *Linear Regressions of Minimum Acceptable Offers in the Third-Party Punishment Game for the Maragoli and the Gusii*

	Maragoli (1)	Maragoli (2)	Gusii (1)
Age	−0.513		0.141
	(0.606)		(0.210)
Female (dummy)	−3.923		1.142
	(9.779)		(2.662)
Education	−6.300	−5.196	−0.721
	(3.101)**	(2.523)**	(0.856)
Income (U.S. $1,000)	−1.574		11.222*
	(13.065)		(5.589)
Wealth (U.S. $1,000)	−4.513		−3.854
	(10.589)		(2.953)
Children	3.568		−0.900
	(3.085)		(0.931)
Constant	134.061	104.787	53.882
	(57.556)**	(31.848)***	(23.045)
Observations	30	30	30
Adjusted R-squared	0.173	0.096**	0.192

Source: Author's calculations based on author data.
Note: Robust standard errors are in parentheses.
*significant at 10 percent level
**significant at 5 percent level
***significant at 1 percent level

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Chapter 13

Sharing, Subsistence, and Social Norms in Northern Siberia

John P. Ziker

The majority of families in Ust'-Avam in northern Siberia are dependent on subsistence hunting, fishing, and trapping and have been part of a vertically integrated industrial economy in a remote area of the former Soviet Union. Thus, the results from behavioral games conducted there in 2003—the dictator game (DG), the ultimatum game (UG), and the third-party punishment game (TPG)—lend themselves to comparison with other indigenous hunter-gatherers, as well as with working communities in other nation-states.

My ethnographic research in the region beginning in 1992 helps to contextualize these results. The two indigenous ethnic minorities in the community (Dolgan and Nganasan) have differing linguistic, religious, and economic histories, and I took these differences into account in my analysis of the game results. Group characteristics did not result in different outcomes in the experiments, although individual and household characteristics did. The results show moderate levels of second-party punishment in the ultimatum game, along with relatively high offers and a notable concern for fairness in the dictator game.

The chapter begins with a summary of the ethnographic material relevant to this community of indigenous hunter-fisher-trappers in northern Siberia. Next, results of player surveys and a descriptive analysis of the game results are presented. The chapter closes with a presentation and discussion of the multiple regressions of the game results.

SUBSISTENCE AND SHARING IN UST'-AVAM

This section presents empirical data on resource use and distribution at the Ust'-Avam research site, as well as ethnographic facts about the population, ethnic groups and languages, and religions. These facts embody relevant information about the community's institutions and social norms, which historically were based on kinship, reciprocity, and reputational mechanisms. Its resource base and property institutions shifted with economic intensification and shifts in settlement patterns during the Soviet period. However, traditional limits on production and prosocial sharing norms remained a defining characteristic of the indigenous communities in the Taimyr region throughout this time. The recent economic history of this remote community in the postsocialist context shows an increased reliance on subsistence and sharing. In particular, a study of contemporary food-sharing practices in the community highlights observed prosocial behavior and references to the norms for sharing summed up in a number of local aphorisms or heuristics. These material and ideological contexts help to explain why certain independent variables affect the game results reported in the following section.

FIGURE 13.1 *Location of Ust'-Avam, Taimyr Autonomous Region, Russian Federation*

Source: Ziker (2003), reproduced with permission.

Location

This research was conducted within the political boundaries of the Taimyr (Dolgano-Nenetskii) Autonomous Region, Russian Federation (see figure 13.1). The region was officially subsumed under the larger Krasnoyarsk Krai as a municipal district, beginning January 1, 2007, as part of a suite of similar consolidations occurring across Siberia in the last few years.

Ust'-Avam, an indigenous Siberian community of 550 people, is situated at latitude 71°07' north and longitude 92°49' east on the Taimyr Peninsula, the northernmost extension of the Eurasian landmass. Ust'-Avam is approximately 250 kilometers by air from the regional capital, Dudinka, and 400 kilometers by water from the industrial city of Noril'sk. Ust'-Avam is one of two native communities in closest proximity to that city. Noril'sk

is located adjacent to the northwestern foothills of the Putoran Mountains, which form the northern boundary of the central Siberian plateau. Modern indigenous settlements such as Ust'-Avam—named for the confluence (ust') of the Avam and Dudypta Rivers—have developed largely in lowland taiga-tundra transition areas and along rivers that cut across the peninsula to the north of the Putorans.

Ethnic Groups and Languages

The indigenous population of Taimyr includes five ethnic groups: the formerly titular Dolgan and Nenets, along with Enets, Nganasan, and Evenk.[1] The Dolgan is a métis population known to descend from Yakut, Tungus (Evenk), Russian, and Samoyedic ancestors. The Nenets, Enets, and Nganasan are considered to be descended from Iron Age immigrants to the region (Klobystin 2006) and related through their Samoyedic languages. Evenks, one of the most widespread indigenous populations in Siberia (Tungus language family), generally live in taiga zones and are known for small communities and small domestic reindeer herds. Russian industrial expansion and mass immigration to the region began in the 1940s with the development of Noril'sk Alpine Metallurgical Combine; the population of newcomers now numbers over 150,000.[2] The indigenous population has come be less than 10 percent of the entire population since the amalgamation with Krasnoyarsk in 2007.

The study community, Ust'-Avam, is approximately 50 percent Dolgan, 45 percent Nganasan, and 5 percent other nationalities from the former Soviet Union. The distinction between Dolgan and Nganasan has been blurring in recent decades, as there have been many mixed marriages between these groups and between members of these groups and non-indigenous individuals (Ziker 2002a). Since elementary education was made mandatory in the 1950s, most everyone in the community speaks Russian. The elders in an ethnic group commonly use the native language (Dolgan or Nganasan) among themselves. Between elders of different ethnic groups, Russian is used. When elders speak to middle-aged or young people, they often use the native language, but the younger people tend to respond in Russian. Young people learn their native language in school as a second language, and the use of Russian is almost universal for people forty years old and younger.

The Dolgan language is similar to Sakha (Yakut), the northernmost branch of the Turkic language family.[3] Nganasan is one of six languages in the Samoyedic branch of the Uralic language family (Dolgikh 1962).[4] The total Dolgan population is approximately 5,500 people in the Taimyr region. The Nganasan population is much smaller at approximately 766 people.

Social Structure and Demographics

Until the mid-1970s, Dolgan families traditionally practiced reindeer pastoralism, mostly in combination with terrestrial game hunting, fishing, trapping, and mercantile trading in extended family groups (Popov 1937, 1964), and later in Soviet-era work collectives. A minority of Dolgan families utilized dog teams for travel instead of domestic reindeer. Mobility was critical for subsistence production and trapping of fur-bearers. Despite the harsh climatic conditions and their focus on hunting, fishing, and trapping, at the beginning of the Soviet era in the 1920s census-takers had identified a small proportion of Dolgan families who owned domestic reindeer herds running into the thousands of head as being rich. To keep track of these animals these families often hired young people from poorer families or distant relatives and paid them with food, supplies, and a small number of reindeer. Some of these families had strong reputations in mercantile trade and would travel hundreds of kilometers from Lake Essei to Volochanka and Dudinka. Soviet authorities viewed such families as exploiters, and many were disenfranchised from the political process when nomadic and clan soviets were established. Most of the Dolgan population lived at that time with smaller reindeer herds used for seasonal subsistence migrations and for checking trap lines (Ziker 2012).

The Nganasan were traditionally known for their wild-reindeer hunting and use of small herds of domestic reindeer for decoys. At the time of the advent of Soviet power, the Nganasan lived in extended family units and had seven exogamous patrilineal clans. Bilateral cross-cousin marriages occurred into the 1940s and 1950s. Shamanism was a strong tradition among the Nganasan, and a few individuals had reputations for being powerful shamans. The shamans' reputation for antisocial behavior is still discussed (for example, a shaman used a human girl's skin on a drum) as the reason for the extinction of that lineage of shamans.

According to 2002 statistics, approximately 80 percent of the native population in Taimyr lived in rural locations such as Ust'-Avam (Goskomstat RF 2002). Today, after eighty years of Soviet and post-Soviet development, the Dolgan live primarily in remote villages, from which they procure areas to hunt, fish, and trap. In Khatangskii District at the far eastern frontier of the Taimyr Region, three predominantly Dolgan communities practice reindeer pastoralism alongside hunting, fishing, and trapping. The majority of Nganasan today live alongside the Dolgan in three permanent settlements; one of these communities is Ust'-Avam.

The construction of modern villages in the 1960s and 1970s increased the total population living in one location, and the kinship relationships that had existed when people lived in families and bands and worked in earlier forms of Soviet enterprises, or in families and bands before Sovietization, became less dense. In addition, some populations were moved significant distances to join people with whom they had previously had few direct relationships. Such politically imposed changes probably put pressure on social norms as the number of contacts with unfamiliar and unrelated individuals increased. In modern Soviet villages, medical care, schools, stores, and the community centers and offices of the vertically integrated hunting-fishing enterprise provided a complex institutional framework, largely managed from the outside. Concomitantly, the 1970s saw a shift in mortality patterns from one of high infant and childhood mortality to one of low infant mortality but increased adult mortality (Krupnik 1987; Ziker 2002a), following the patterns of the demographic transition. In many ways, the Dolgan and Nganasan lived under conditions that paralleled life in northern indigenous communities in North America.

Religion

The Dolgan accepted Russian Orthodoxy in the nineteenth century. Dolgan shamans coexisted with Dolgan Christianity until the mid to late 1930s, when purges under Joseph Stalin resulted in the arrest and execution of shamans across Siberia. Nevertheless, animistic beliefs and taboos of various sorts exist to the present day. Dolgan informants often claim Russian Orthodoxy as their religion, and although there are no churches in the immediate area, symbols of Orthodox Christianity, such as icons, are displayed in some houses.

The Nganasan did not adopt Christianity during the Russian colonial period (Popov 1963, 1966). The Nganasan modified their settlement pattern to live largely north of the tree line, thus avoiding Russians and the ancestors of the Dolgan population who migrated from the south. This more northerly strategy facilitated minimal involvement with the Russian state. Nganasan shamans were active in the 1970s, but all of the elder Nganasan shamans are now deceased, and few, if any, Nganasan have the knowledge to conduct a traditional suite of shamanic rituals. However, some Nganasan religious rituals, such as paying homage to the family protector spirit, are still practiced.

Economic History

Native people in Taimyr began the twentieth century as sovereign tribute-paying nationalities within the Russian empire. Then, beginning in the 1930s, extended families and native bands in the Avam tundra became increasingly drawn into economic development under Soviet ministries. As a result of Stalin's collectivization campaign, eventually most domestic reindeer herds were collectivized and turned over to a growing cadre of professional managers, veterinarians, and distribution networks. Simultaneously, cultural stations were set up at traditional trading and gathering locations along major rivers. Cultural stations manned by Soviet activists grew over the years to include schools, medical services, and stores. These locations also housed the offices of early Soviet work groups (artel') and collective farms (kolkhoz).

More than eighty kolkhozes were developed in the region, but these were amalgamated in the 1950s and 1960s into seventeen larger, more sedentary, and more ethnically diverse state companies (sovkhoz). By the 1970s, most native adults worked as salaried hunters, fishers and trappers, craft producers, and laborers within state companies, as well as in administrative and educational staff positions. Thus, the concepts and experience of working in a salaried organization, receiving bonuses, and purchasing goods have a reasonably long history in Taimyr.

In 1971 the government hunting enterprise GPKh Taimyrskii was established in the Avam tundra and along the Piasino River. GPKh Taimyrskii was one of four such enterprises in the Soviet Union—large units administered directly by the Ministry of Hunting. GPKh Taimyrskii

had four subdivisions, three of which were predominantly staffed with non-natives. In 1993 the Ust'-Avam subdivision had fifty-five local indigenous men distributed in twenty-one assigned hunting territories (ugod'ia). GPKh Taimyrskii annually procured more than 50,000 caribou in the late 1980s. In the state economy, the production of meat from wild and domestic reindeer, freshwater fish, and the pelts of fur-bearers reached all-time highs during Mikhail Gorbachev's Perestroika period (1987 to 1991).

The GPKh Taimyrskii hunting and fishing brigades in Ust'-Avam each had annual plans for the production of white and red fish, reindeer, Arctic fox, and other fur-bearers. Staff hunters were paid, and they had the opportunity to receive prizes and additional cash for surplus production. By the 1980s, there were no domestic reindeer left in the organization, and the focus had shifted to the procurement of wild resources. The standard of living in communities like Ust'-Avam was high by Soviet standards, and residents had access to trade goods that were difficult to obtain in Soviet cities. The people of Ust'-Avam were well integrated into the cash-based planned economy.

Major economic changes occurred after 1993. Sovkhozes and the GPKh Taimyrskii were stripped of most of their functions other than basic municipal services for remote communities. Dolgan and Nganasan hunters no longer received salaries, and the production of game, fish, and fur began to fall. Women, many of whom worked in the GPKh Taimyrskii sewing shop, were reclassified as hunters in 2000, meaning that they, too, would no longer be salaried workers. Currently, a small number of community members are employed as teachers and civil servants, and many people receive social security pensions and environmental degradation compensation from Noril'sk Nickel, the mining and metallurgy company in Noril'sk.

The people of Ust'-Avam now have a mixed-subsistence economy in which hunting, fishing, and trapping predominate over commercial food production and exchange. In my ethnographic study among the Dolgan and Nganasan during the 1990s (Ziker 2002a), I found that the local subsistence economy had become increasingly important after the collapse of the Soviet planned economy and that other consequences of the economic upheaval were an increase in the incidence of violent death and reduced overall fertility (Ziker 2009).

Natural Resources and Property

Today the Dolgan and Nganasan in Ust'-Avam continue to hunt wild reindeer, fish, and trap, and they still consume these foods at almost every meal (Ziker 2002b). As a result of Soviet development of their economy, the loss of domestic reindeer, and their settlement in large villages, they now largely rely on combustion-powered transportation (snowmobiles and outboard motors) for much of their subsistence activity. However, depending on a family's wealth, the time of year, and fuel supplies, a portion of hunting, fishing, and trapping activity occurs on foot (Ziker 2007).

Alongside the economic depression and emergent subsistence economy in the post-Soviet period, presidential decrees, federal laws, and regional edicts have favored a variety of forms of property intended to protect the traditional economic activities of the indigenous population. A mix of formal landholdings and informally managed common-pool territories has been utilized.

Surrounding the village of Ust'-Avam itself, a common-pool hunting and fishing territory (liubitel'skaia ugod'ia) became more important as hunters and other workers were laid off and more distant hunting territories were not supplied by the GPKh Taimyrskii. Common-pool territory effectively expanded after the cessation of large-scale caribou hunts on water in 1993.

“Family-clan” holdings and similar types of collective property, otherwise known as “communes” (obshchina), were carved out of former state-farm lands to aid the indigenous people in protecting their economic traditions (Ziker 2003).[5] The Avam tundra had only one registered family-clan holding at the time of this research. The holding was rarely used because of its distance from the village.

The land surrounding the common-pool territory of Ust'-Avam, previously assigned to hunting and fishing brigades during the Soviet Union, continued to be used by those individuals who were members of those brigades or their relatives. These lands were mainly used for subsistence hunting and fishing, with the surplus distributed within the community and exchanged for fuel and spare parts. Extremely distant territories, more than 150 kilometers from the village and those not located on major waterways, fell into disuse in the 1990s.

The Dolgan and Nganasan manage their common-pool resources with a variety of context-specific norms that include and exclude specific people in particular forays at particular spots (tochki). I documented such informal means of regulating property in the bush, particularly during goose-hunting season and the on-water caribou hunt, and I also documented ways of regulating access to and multiple rights for resources in the community (Ziker 2002a, 2003; see Anderson 2000).

Contemporary Food-Sharing

The collapse of rural food production in Russia after 1991 increased dependence on subsistence production across a wide range of the population. Dolgan and Nganasan widely share in the distribution of meat, fish, and fur—goods necessary to survival in this region. Women and elders are prominent actors in the distribution and preparation of game, fish, and fowl. Empirical data on the inputs, outputs, and conditions of hunting, along with data on food distributions, relative quantities, relationships of receivers to givers, and hunters' rationale for sharing, showed a number of significant social and ecological effects (Ziker 2007).

First, distributions of food procured while hunting on foot were largely oriented to provisioning kin, through the rationale of “hosting” and “returning aid.” A minority of distributions went to those who asked. Second, hunts that utilized mechanical transportation had more participants, the distributions were broader, and the rationales for hunting included more requests and trades; in addition, significantly more food was distributed in recognition of participation in the hunt. In mechanized hunts, procurement events represent more cooperation (by-product mutualism, tit-for-tat reciprocity, or exchange) in the production and distribution process. Overall, production volume and parameters affect distribution patterns and rationales: when production levels increase and hunting partners are included, more food goes to nonkin; when production levels are limited, the bulk of food goes to kin, particularly close kin. Third, informal social networks are the main conduits by which local food is locally distributed (Ziker 2002a; Ziker and Schnegg 2005), providing another venue for collective-action coordination. Focal follow-up surveys and rank-order interviews of households in the community indicated that the average household's food-sharing network included ten to fifteen other households.

The local cultural logic of sharing appears to encourage altruistic giving through heuristics (Ziker 2006) that reflect salient evolutionary pressures (kin selection, reciprocity, ancestral value on cooperation). Finally, close kin are differentially “gifted” food, while more distant kin, friends, acquaintances, and others tend either to help on the hunt or to ask for food. This indicates that the most altruistic giving is more common with kin, while reciprocal altruism and tolerated scrounging are more common with more distant social relations.

Implications for the Economic Experiments

The hardships of the postsocialist economy, the use of common-pool territories and nonmarket food-sharing, the demographic profile of the community, and the study community's continuing but limited contact with markets held a number of implications for the behavioral experiments.

First, food-sharing is in large part a manifestation of the larger kinship estate that maintains active use of hunting spots and territories. Kinship, both genealogical and affinal, is the most commonly mentioned vector for food transfer. One might expect that a kinship variable, such as the number of descendants in the community, could have an effect on decisions in the experiments.

Beyond kin, there is an expectation in the community that those with food (the “haves”) will give it to those who are unable to produce food (the “have-nots,” including the elderly, single mothers, and those who are not good at hunting). This expectation is expressed in local social norms. If individuals who are relatively well off carry such ideas into the experimental games, one might expect a positive correlation between generosity and economic indicators.

Similarly, as production levels increase and surpluses can be exchanged for fuel, spare parts, hunting supplies, and consumer goods—necessary for months-long hunting seasons in the tundra—one finds greater dependence on actors in the regional market (middlemen). Such people have various reputations in the community for dealing unfairly (often) or fairly (rarely). A concern for fairness would be expected among those who have greater experience with the market.

Third, because of the different religious and ethnic backgrounds of the two major indigenous ethnic groups in the community, one might expect

some differences in the game results. These expectations are discussed after the description of the methods and the results of the experiment.

METHODS

Here I first describe the details of the experiment that were particular to this research setting. Then I provide some descriptive information on the independent variables, including income, wealth, and religion, that were derived from the questionnaire associated with the experimental protocol. The section closes with a description of the results of decisions in the games.

My research in Ust'-Avam began in January 1994 and ran intermittently for a total of twenty months through March 2003. I spent an additional eighteen months in the regional capital and three other small communities in the Taimyr region, beginning in 1992. The trust and rapport I built up with the community over this period helped both to achieve consensus in performing the experiments and to guarantee that participants believed that their decisions were real and they would be paid.

The ultimatum game and dictator game experiments were administered in Ust'-Avam during a January–March 2003 research visit supported by the Max Planck Institute for Social Anthropology. The experiments followed the protocols provided by Joseph Henrich (chapter 3). I conducted the experiments in Russian—the community lingua franca. Three rooms in the village school were used, and five research assistants monitored subjects and read protocols (see photo 13.1). The show-up fee of 100 rubles (U.S.$3.10) was approximately equal to an average daily income. The stake for each game was also set at 100 rubles.

PHOTO 13.1 *Reading a Game Protocol*

Source: Author's photograph.
Note: Research assistant Natasha Chuprina reads a game protocol in Ust'-Avam, 2003.

The village administration supplied what is called a "social passport" for the community, which was a list that included individual and household information. There were 163 households listed on the document. (Fifteen households located in an outlying community 180 kilometers by river away from Ust'-Avam were not included.) Of the individuals living in Ust'-Avam, I chose every third adult and did not pick more than two individuals from one household. One ethnic Russian refused to participate in the experiment. One individual could not understand the instructions during individual testing and had to be excused after filling out a player data sheet (and being given the show-up fee). One passerby was added to the subject pool prior to initiation of the games because of a no-show. With these exceptions, the sample is a random selection of the adults in households across the community. Fifty-nine individuals played both games—thirty playing the role of player 1 and twenty-nine playing the role of player 2.[6]

Independent Variables

Player data sheets were used to generate independent variables on the players. There were thirty-two female and twenty-eight male participants, age eighteen to seventy-nine. As mentioned, one participant, a seventy-one-year-old female, dropped out of the experiments after she failed to understand the test questions. The average age of participants was 38.72, with a standard deviation of 12.75 years. The skewness and kurtosis figures were low, and a histogram of age closely follows a normal curve.

Education, in years, was reported for fifty-eight of the sixty participants. The mean education was 9.60 years, with a standard deviation of 2.36 years. The distribution is not skewed, but thirty-three individuals reported the mode (ten years of education), and the variable's kurtosis is abnormal. Square root and natural log transforms of years of education also show a lot of variation on normal probability (Q-Q) plots.

There were twenty-eight Nganasan and thirty-two Dolgan participants. Ethnicity was described in the social passport under “national’nost’” (Dolgan, Nganasan, Nenets, and so on) and coded as a dummy variable (Nganasan and non-Nganasan). Because of the correspondence between ethnicity and religion (all pagans are Nganasan, as described below), the two variables were not used in regression models at the same time.

Household size ranged from one to eight individuals and averaged 4.68 individuals, with a standard deviation of 2.11. The distribution is relatively flat across the sample. Nevertheless, the normal Q-Q plot shows observed values very close to those expected, and so the variable is useful for multiple regressions. The mean number of children was 2.25, with a standard deviation of 2.25. Households did not necessarily include all of an individual's offspring, however, as older children tended to get their own apartment. The distribution of the total number of offspring is skewed right among Ust'-Avam participants because eighteen of sixty individuals had no children. Further, there is a strong correlation between age and number of descendants in the data set, so controlling for age is important when considering the number of offspring. Only one of these variables is used at a time in further analysis since there is a strong relationship between household size and number of offspring.

There were two questions regarding religion on the player data sheets. The first question was an open-ended inquiry on religious affiliation. The

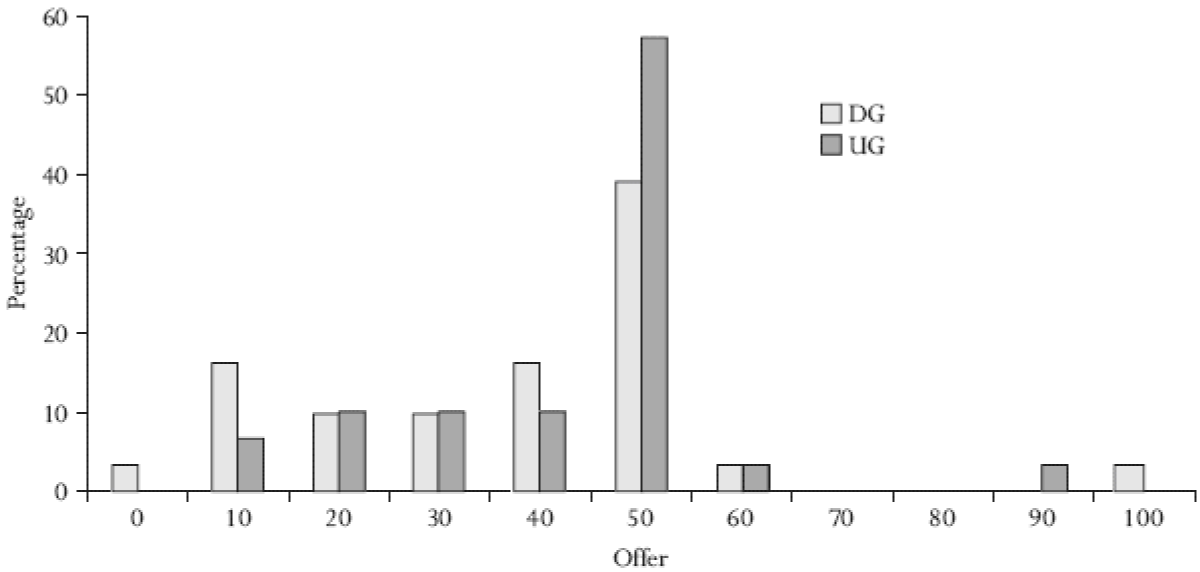
second had to do with the frequency of religious attendance. Sixteen respondents—all Nganasan, and approximately one-quarter of the pool—classified their religion as “pagan” (iazychnik) or “Nganasan.” Twenty-four respondents said that they were Russian Orthodox, including two Nganasan. There was one expressed atheist. The remainder left the question blank (ten Nganasan and nine Dolgan). I set up three dummy variables to represent the positive listing of religion: pagan, Christian, and either religion. The fact that approximately one-third of the sample was equivocal about religion (or was an expressed atheist) probably reflects the influence of Soviet economic development and political activism, which repressed indigenous Siberian religions in the early nineteenth century.

Twelve of sixty participants filling out data sheets reported religious attendance greater than zero times per week. Since only three of these participants ended up being assigned the role of player 1, using the religious attendance variable entails the loss of many cases for looking at game results. However, religious attendance indicates a strong commitment to social norms and may be of interest. In addition, attendance at religious services is not related to being pagan (Pearson chi-squared 0.341, p = 0.559), but it is related to being Christian (Pearson chi-squared 4.444, p = 0.035), even though there are no churches in the vicinity. This is because two individuals indicated that they attended church more than once a day, and they were both Christian. It is possible that they conducted religious rituals in their homes, as Orthodox icons are found in some homes.

Income showed great variance. Annual incomes ranged from 0 to 171,000 rubles (U.S.$5,516). The annual mean income was 38,964 rubles (U.S.$1,256) for all participants in the study. These figures include individuals with jobs in the village, individuals receiving pensions and other social payments, and the unemployed. The standard deviation was 39,617 rubles. The distribution is skewed right because of six individuals making over 100,000 rubles per year and 30 percent of the sample making less than 10,000 rubles (U.S.$310) per annum. Six claimed to have no annual income at all. Although these are missing data, it is unlikely that they would change anything significantly, as these informants were unemployed and probably received only minimal social compensation from the state (that is, in the 10,000-ruble-per-year range). The log transform drops six cases because their income was zero. Both the log and square root transforms are very close to expected values according to normal probability (Q-Q) plots. The

square root of income is preferred because it is less skewed and does not drop the zeros.

FIGURE 13.2 *Distribution of Offers in the Dictator Game and the Ultimatum Game in Ust'-Avam, 2003*



Source: Author's compilation of author data.

To understand the average purchasing power of the average income, consider that in March 2003 a one-way helicopter flight from Ust'-Avam to Dudinka cost the equivalent of U.S.$90.65—a figure close to the average month's income. Regular travel to and from the regional capital was not possible for many villagers. A loaf of bread—sold under state-supported prices—cost 20 rubles, or approximately 63 cents, at the village bakery. Many people made their own bread, however, and a kilogram of high-quality unbleached flour was relatively costly at 30 rubles, which is approximately what bulk flour costs today in U.S. supermarkets.

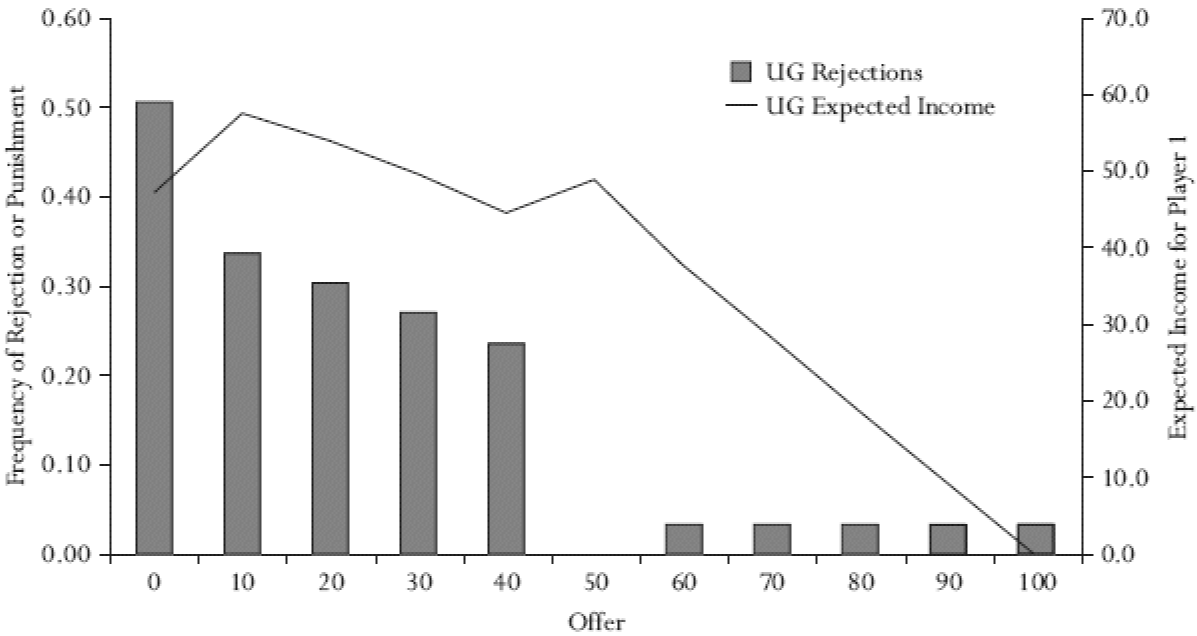
Participants were asked to list items that could be considered capital wealth, including snowmobiles, sleighs, boats and boat motors, firearms, sewing machines, bank accounts, and other items of capital wealth. Since many of these items were purchased either before the 1991 collapse of the Soviet economy or during the period of rapid inflation during the 1990s, depreciation was not figured. Rather, the wealth variable is simply a cumulative count of items listed. The range of answers was zero to seven,

with a mean of 1.7 and a standard deviation of 2.02. Skewness and kurtosis figures for wealth are less than one, and a normal Q-Q plot of wealth shows observed values close to expected values.

Descriptive Statistics on the Game Results

The mean offer in the dictator game in Ust'-Avam was 37.3 percent of the stake, but the modal offer (twelve offers) was 50 percent of the stake (figure 13.2). The Dolgan and Nganasan had the highest proportion of fifty-fifty offers across all study communities (see chapter 4). The mean offer was midway along the distribution of study communities. The second and third most frequent offers in the DG were 10 percent (five offers) and 40 percent (four offers). The distribution of these data suggests that concern for fairness was strongly internalized for the majority (53 percent) of participants. Attempts to maximize income (by offering 0 or 10 percent of the stake) were found for a small minority (20 percent). By far the majority of respondents were fairer than they had to be in the DG, considering the random and blind assignment of their decision.

FIGURE 13.3 *Distribution of Rejections in the Ultimatum Game and Expected Income for Player 1 in Ust'-Avam, 2003*



Source: Author's compilation of author data.

The most frequent ultimatum game offers in Ust'-Avam (made by close to 60 percent of player 1s) were 50 percent of the stake; average offers were slightly lower (48 percent). To have mean offers hovering around 40 percent in the UG with the mode at the fifty-fifty split is characteristic of studies of university students and Western societies (Oosterbeek, Sloof, and van de Kuilen 2004; see also chapter 2). Mean and modal offers in Ust'-Avam were in the middle of the range of findings by Joseph Henrich and his colleagues (2004). There were two hyper-fair offers in both games, totaling 7 percent of offers.

In general, the UG results show a heightened tendency to make the modal offer in comparison to the DG, as should be expected under the knowledge of potential second-party punishment. In addition, in the UG there was a significant reduction in the frequency of offers at 10 percent or below. Hyper-fair offers occurred at the same low frequency in the UG and DG. The correlation between DG offers and UG offers in Ust'-Avam was 0.320, with a statistically suggestive *p*-value of 0.084 (two-tailed). The weak correlation between game results appears to be related to the shift of

player offers to the modal offer with the knowledge of the potential for offers to be rejected.

Surprisingly, the Dolgan and Nganasan were moderately accepting of low offers on average in these experiments. An examination of the distribution of rejection rates (figure 13.3) shows that approximately 52 percent of respondents rejected offers of 0 percent. With offers of between 10 and 40 percent, player 2s were increasingly accepting. At offers of 50 percent, there was universal acceptance. One informant rejected all hyper-fair offers. As mentioned earlier, two hyper-fair offers occurred once in the UG and once in the DG.

The average minimum acceptable offer (MinAO) for the Ust'-Avam experiments was 14.8 percent of the stake (with twenty-nine player 2s). For comparison, the average MinAO for experiments at Boise State University in 2005 (Ziker et al. 2006) was 25.5 percent (eleven player 2s). Daniel Kahneman, Jack Knetsch, and Richard Thaler (1986, S291) report an average MinAO of 25.9 percent in experiments with psychology students at the University of British Columbia.

Running over the player 2 rejection pattern in figure 13.3 is the projected income for each player 1 offer. The income-maximizing offer (IMO) for player 1s would be 10 rubles, considering the rejection pattern. It is possible that a number of player 1s had a sense that a 10 percent offer was acceptable for a significant number of community members (represented by player 2s in the UG) based on their own thinking about making such a decision. The risk of being rejected dropped 18 percent from offers of zero to offers of 10 rubles, and the potential payoff was relatively great. The next best offer was 50 rubles in the UG, with no rejections and thus a sure chance of receiving the 50 rubles.

REGRESSION RESULTS

What variables are related to these patterns? In this section, I present the results of multiple regression analysis of the DG, UG, and MinAO (dependent variables) in order to explore the independent variables related to patterns seen in the game results. In each case, I begin with the standard set of variables used in the project. I then change the sets of independent variables to focus on those that are the best predictors of the pattern within this community. Finally, I summarize the results of the regression analyses

and suggest why some variables are good predictors of the dependent variable and others are not.

Table 13.1 shows the linear regression results for four different combinations of independent variables in predictions of DG offers. Model 1 is the standard set of variables as indicated in the guidelines for this book (see chapters 3 and 4). The variables age, sex, years of education, and wealth-divided-by-household-size were not related to DG offers. Individual income was the only significant variable. For each standard-deviation increase in income, DG offers increased almost 17 percent.

Model 2 leaves only income from the previous model and adds wealth, household size, and number of examples. This combination of variables significantly increases the adjusted R-squared of the model and results in high model significance. A standard-deviation increase in wealth results in a 7.5 percent decrease in DG offers. Similarly, a standard-deviation increase in household size decreases DG offers by 6.7 percent. This is probably why the combined variable showed no relationship to offers. On the other hand, increasing the number of examples read in the experiment resulted in a 6.5 percent increases in offers.

Model 3 replaces wealth with attendance at religious services. The goodness of fit remains the same (adjusted R-square = 0.413) at high model significance, but the constant itself falls out of the range of significance. A standard-deviation change in attendance at religious services increases DG offers by 15 percent in model 3.

In model 4, both wealth and attendance at religious services are included. With t-statistics at +/−1.5, both variables have coefficient significances of $p = 0.135$ in model 4. Although this is far from standard levels of acceptable significance, these variables show some potential for being related to DG offers when each is considered separately, as shown in models 2 and 3. Model 4 explains the most variance (R-squared = 0.560), but adding the wealth and attendance at religious services variables at the same time dilutes their specificity.

TABLE 13.1 *Linear Regressions of Ust'-Avam Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	−0.186			
	(3. 949)			
Female	−5.181			
	(7.906)			
Education	−2.511			
	(4.540)			
Individual income	16.788**	16.424***	17.272***	17.856***
	(6.401)	(5.110)	(5.183)	(5.029)
Wealth/household size	−5.334			
	(4.305)			
Wealth		−7.534*		−6.813
		(4.494)		(4.373)
Household size		−6.736*	−6.774*	−6.537*
		(3.849)	(3.848)	(3.727)
Attendance at religious services			15.446*	13.969
			(9.211)	(8.963)
Number of examples		6.576*	6.828*	6.379*
		(3.546)	(3.535)	(3.433)
Constant	37.121	25.127*	17.863	21.776*
	(23.489)	(12.679)	(10.336)	(12.656)
Observations	29	29	29	29
Model significance	0.133*	0.000***	0.000***	0.004***
Adjusted R-squared	0.139	0.413	0.413	0.450

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. Coefficients are standardized by (divided by) the standard deviation.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at =/< 0.10 level in two-tailed test

In table 13.1, the income variable shown is the square root of income, following recommendations for normalizing the distribution (Tabachnick and Fidell 2007). If, instead, actual income figures are used, in model 1 the constant is significant at the < 0.10 level, and in models 2 to 4 the constant is significant at the < 0.01 level. In addition, the variable coefficient for income is lower at 12 to 13 (standardized errors of approximately 3) with much stronger significance (0.000 in most models). Also, the standardized coefficient for wealth (approximately 10 percent) is significant at the < 0.05 level in models 2 and 3, and the coefficient for attendance at religious services (15 percent) is significant at the < 0.10 level in model 4. Real income seems to be more comparable to the other continuous variables and

may provide a better goodness of fit (adjusted R-squared = 0.539 in model 2).

Overall, the statistical analysis indicates that DG offers are most strongly predicted by individual income, household size, the number of examples given in the one-on-one sessions, and marginally by wealth and attendance at religious services. This is true for either income variable (actual income or its square root). Other variables, including age, sex, ethnicity (dummy), religion (pagan, Christian, all-religions dummies), years of education, wealth-divided-by-household-size, and number of offspring, show no indication of a relationship with DG offers when added individually to a regression on income and number of examples.

DG offers are increased by individual income, number of examples read, and attendance at religious services. Participants who had greater disposable income may have made higher offers because they felt a stronger compunction to follow social norms for fairness. Participants who had been given more examples took longer to understand the math. It is possible that they also did not identify with selfish motives, or that they were not as experienced in making monetary decisions and so went with what seemed like more equitable decisions. Religious attendance also may indicate an interest in social norms of fairness and greater egalitarianism in decisions. Household size and wealth decreased offers. With larger households, competition over household resources could train individuals to be more selfish overall. Similarly, it takes more selfishness to amass and maintain wealth items in small-scale communities such as Ust'-Avam.

TABLE 13.2 *Linear Regressions of Ust'-Avam Ultimatum Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)
Age	1.353		
	(3.678)		
Female	–0.943		
	(7.364)		
Education	–1.699		
	(4.229)		
Individual income	1.563	2.077	
	(5.962)	(4.906)	
Wealth/household size	–1.085		
	(4.010)		
Household size		–2.279	
		(3.335)	
Number of examples		–3.051	
		(3.611)	
DG Offer			0.249*
			(0.139)
Constant	45.684**	51.106***	33.686***
	(21.879)	(12.726)	(5.935)
Observations	29	29	29
Model significance	0.984	0.680	0.084*
Adjusted R-squared	–0.184	–0.054	0.071

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. Coefficients are standardized by (divided by) the standard deviation.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at =/< 0.10 level in two-tailed test

Table 13.2 shows the linear regression results for three different combinations of independent variables in predictions of UG offers. Model 1 is the standard set of variables for this project. The variables age, sex, years of education, individual income, and wealth-divided-by-household-size were not related to UG offers. Model 1 had a negative and insignificant ability to predict variation in UG offers.

Model 2 includes variables that were successful in explaining DG offers: household size and number of examples. Wealth was also added, as were attendance at religious services, ethnicity, religious dummies, and number of offspring. None of these variables had any success in predicting UG offers.

Model 3 drops all unsuccessful variables and includes the offer made in the first game (the DG offer). A standard-deviation increase in DG offer was related to a one-quarter-percent increase in UG offer at the < 0.10 level

of statistical significance. The model has a positive goodness of fit. Along with the constant, model 3 explains about 10 percent of the variance in UG offers (R-squared = 0.103) at the < 0.10 level.

TABLE 13.3 *Linear Regressions of Ust'-Avam Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	−4.950	−3.687	−4.134	
	(4.877)	(4.465)	(3.832)	
Female	8.291			
	(10.369)			
Education	−4.552			
	(4.931)			
Individual income	−1.386			
	(7.517)			
Wealth/household size	−0.926			
	(3.909)			
Wealth		−2.809		
		(3.683)		
Household size			−6.613*	−6.954*
			(3.487)	(3.483)
Ethnicity (dummy)		1.127		
		(9.550)		
Christian (dummy)		−1.198		
		(9.217)		
Number of examples			6.888**	6.607*
			(3.243)	(3.243)
Constant	46.397*	29.413*	28.351*	17.044
	(26.641)	(14.558)	(14.833)	(10.529)
Observations	30	30	30	30
Model significance	0.861	0.825	0.067*	0.047**
Adjusted R-squared	−0.131	−0.098	0.155	0.149

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses. Coefficients are standardized by (divided by) the standard deviation.
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at =/< 0.10 level in two-tailed test

That no independent social or economic variables explained UG results indicates the strong pressure to make fair offers in light of the possibility of second-party punishment. Similar results were found when using real income instead of square root of income.

Table 13.3 shows the linear regression results for four different combinations of independent variables in predictions of minimum acceptable offers in the UG. Model 1 is the standard set of variables for this project. Importantly, data on MinAOs provide a way to analyze the

decisions of those who participated as player 2 and to understand the willingness of the population to employ costly punishment to enforce social norms. The variables in model 1—age, sex, years of education, individual income, and wealth-divided-by-household-size—show no relationship with MinAOs.

Model 2 retains age, which was the variable that had the strongest *t*-statistic in model 1, and adds wealth, the ethnicity dummy variable, and the Christian dummy variable. Again, the adjusted R-squared (goodness of fit) is negative, and there is no statistical significance to the model. The result is similar when ethnicity, pagan, and religion dummy variables are considered separately in this model.

Model 3 again retains age, but drops other variables that previously showed no relationship to MinAOs. Model 3 adds the household size variable and the number of examples in the UG. Other combinations are also attempted in place of age, including number of examples in the DG, attendance at religious services, ethnicity dummy, religion dummies, and number of offspring. No combination of variables provides any better goodness of fit or model significance. Model 3 has statistical significance and explains 24.5 percent of the variation (R-squared = 0.245) in MinAOs with a positive goodness of fit (adjusted R-squared = 0.155).

Model 4 drops age and retains number of examples and household size. Both independent variables retain *t*-statistics at or above −2 and statistical significances just over the </= 0.05 level, but the model's constant drops out of statistical significance. Model 4 has the highest statistical significance overall and has goodness of fit close to that of model 3. Model 4 explains 21 percent of the variation (R-squared = 0.210), but it may be somewhat underspecified (adjusted R-squared = 0.149). No other independent variable could be found to help predict MinAOs.

Household size is negatively related to MinAOs in models 3 and 4. A standard-deviation increase in household size results in 6 to 7 percent decreases in minimum acceptable offers. Individuals in larger households may have been willing to accept lower offers because, living in such households, they were likely to be sharing a collective pie with a larger number of people on a daily basis and were thus accustomed to accepting smaller portions. Significantly, the effect of household size on DG offers is also reflected in MinAOs: increasing household size reduces DG offers and MinAOs. In models 3 and 4, a standard-deviation increase in the number of

examples increases MinAOs by almost 7 percent. Similar to the effect of number of examples on DG offers, this effect may reflect some participants' lack of mathematical ability or the fact of being less mathematically inclined, which might have made them tend to be more careful and to search for the “right” (more egalitarian) decision.

The overall rejection rate in the Ust'-Avam experiments is somewhat lower than the 23.7 percent rate found among the Hadza (Marlowe 2004) and lower than the rejection rates found in experiments among university college students (Roth et al. 1991) and other Western populations among whom there was a 22.5 percent average rejection rate in six sessions (Abbink et al. 1999). The Ust'-Avam rejection rate is significantly higher than that found among the Kazakh, Quichua, Ache, and Tsimane', among whom rejection rates were less than 5 percent (Henrich et al. 2004). The rejection patterns among the Dolgan and Nganasan were close to those of the Hadza (chapter 6, available at: http://www.russellsage.org/Ensminger) and in the middle of the distribution of societies included in this project. The independent variables that explain the variance in rejection rates in Ust'-Avam are household size and number of examples read in the experimental session. These results suggest that the widespread practice of sharing within the community is reflected in both the relatively low average minimum acceptable offer and the effect of household size on MinAO. The social norm of food-sharing is reflected not only in the number of local concepts and aphorisms on the subject but also in the regular distributions to relatives, friends, and those who needed food that researchers consistently observed across the community.

CONCLUSIONS

What were the expectations for the games in light of the contextual information for Ust'-Avam provided at the outset? The first expectation was that kinship, as documented in interviews and repeated visits, would be confirmed as an important vector of resource and food-sharing in the community. If kinship assumptions carried over to the games, then one might expect individuals with more offspring to be more generous. A better measure might have been number of relatives in the community, but that information was not included on the player data sheet, since the definition of “relative” is difficult to standardize across cultures. Using my

genealogies and census information for the community, I counted the number of living siblings, aunts and uncles, and first cousins for every player. Linear regression of these kin counts on DG offers, UG offers, and MinAOs were uncorrelated.

PHOTO 13.2 *Game Participants and Research Assistant Listening to the DG Protocol After Filling Out Player Data Sheets*

Source: Author's photograph.
Note: Ust'-Avam, 2003.

I also investigated the effect of the presence of a living father, mother, or spouse on UG offers, DG offers, and MinAOs, using independent sample *t*-tests. Two of nine *t*-tests show significant differences. First, the difference in mean UG offer of players with living versus nonliving spouses (a mean of 40 for those with a living spouse versus a mean of 60 for those without a living spouse) is significant ($t = 2.162$, $p = 0.042$). Second, the mean MinAO of players with a living versus nonliving father (a mean of 18 for those without a living father and a mean of 3.333 for those with a living father) is significant ($t = 2.634$, $p = 0.022$). Having a living spouse lowers

the mean UG offer, and having a living father lowers the mean MinAO. In both cases, the effect is a result of a few individuals with neither a living spouse nor a living father playing in a more generous fashion. While suggestive, the overall effect of kin on game play is not robust, which may be a result of the anonymous and uncontextualized nature of these experiments.

Furthermore, in regression analyses of data from the player data sheets, the players' number of offspring and their age were not related to player 1 offers in either the dictator game or the ultimatum game or with player 2 minimum acceptable offers in the ultimatum game. The number of individuals living together (household size) was shown to be a negative factor on offers in the DG and with MinAOs. This result may indicate greater levels of competition over resources in larger households. Overall, the kin effects on game behavior in this set of experiments are minimal.

A second expectation about sharing in the community is that those with resources (the "haves") would make transfers to those who do not have resources (the "have-nots," including the elderly, single mothers, and those who are not good at hunting), as documented in many food-sharing studies. Carrying this idea into the games, one might expect a positive correlation between generosity and economic indicators, such as wealth. In fact, the opposite was demonstrated. Wealth indicators are negatively related to DG offers. It is likely that maintaining wealth items in the community indicates a history of not lending them out, and thus greater concern for self. On the other hand, disposable income is positively related to higher offers in the DG, as predicted.

Considering the hardships of the postsocialist economy, one might expect increased selfishness over limited resources during the transition to a free market. In fact, a frenzy of property acquisitions occurred in central regions of Russia in the 1990s, and the privatization of industry was notoriously corrupt. In the Ust'-Avam community, by contrast, common-pool territorial strategies and nonmarket food-sharing developed to deal with the vagaries of cash payments and the supply of consumer goods. The demographic profile of the community indicates much stress on adults (high mortality rates due largely to binge-drinking), illustrating limited but influential contact with markets—the source of alcohol and other consumer goods. Only a few individual incomes were greater than two standard deviations above the average income, and many individuals received less

than the mean because their only source of income was social welfare. A concern for fairness might be expected among those who had greater contact with outside bureaucracy and institutions—such as teachers and other civil service workers—and among those who were better able to make purchases in the market. In addition, I observed that people in Ust'-Avam who had money pooled money with relatives to purchase wealth items, such as new rifles. Similarly, very successful hunters and fishermen in Ust'-Avam were regularly traded surplus with middlemen to acquire fuel and supplies. They were very concerned with the fairness of trades and often discussed unfair traders. In fact, regression analysis indicates that standard-deviation increases in income are strongly related to increased DG offers, but unrelated to UG offers and MinAOs. In the UG, it is likely that potential costly punishment drowned out the income effect on fairness.

Third, one might expect some differences in the game results attributable to the different religious and ethnic backgrounds of the two major indigenous ethnic groups in the community. Interestingly, there were no differences by ethnic group or religion, although frequency of attendance at religious services (indicated by twelve of sixty participants) was marginally related to increased DG offers.

Generosity is encouraged among the Dolgan and Nganasan through kinship, food-sharing, and common-property traditions, including maxims, aphorisms, and cosmological ideas that reward giving and emphasize negative outcomes of selfishness. It appears that these norms of sharing manifest in the pattern of DG offers in Ust'-Avam. In the UG, there were moderate numbers of low offers and moderate levels of punishment, which may reflect the social norms surrounding reciprocal sharing and by-product cooperation in collective procurement events. There was a small level of risk-taking in the community, as exhibited by a low incidence of low UG offers and a complementary moderate level of willingness to punish egoists. Player 2s expressed a willingness to accept what was given in the postgame interviews. The influence of individual income on DG offers also probably reflects individual experiences with exchanges in the larger economy. All of these results are consistent with Ust'-Avam's subsistence hunting-and-gathering lifestyle, common-pool resources, and expectation that all community members are entitled to aid.

This research would not have been possible without the goodwill and cooperation of the people of Ust'-Avam. Many thanks go to the game participants, some of whom are pictured in photo 13.2. Funding for this research was provided by the Max Planck Institute for Social Anthropology. This chapter is based on work supported by the National Science Foundation (grants BCS 0136761 and OPP 0631970). I thank Joe Henrich, Jean Ensminger, and Will Palmer for comments on the manuscript.

NOTES

1. All five groups are considered "small-numbering Northern peoples" (malochislennye narody Severa), following Soviet ethnicity policy for thirty such ethnicities. Larger-numbering native groups, such as Sakha, Tuvan, and Buriat, have greater political autonomy within Russia and the states referred to as "republics."

2. Histories of Siberia (for example, Forsyth 1992) document the presence of Russian trappers, Cossacks, and Orthodox missionaries in the region since the mid-1600s. Russian immigrants were few in number, however, and the colonial relationship stipulated a degree of autonomy to native peoples (inorodetsy, or "Russian people of another faith"), reflected in the ordination of native kings and administrative tribes.

3. There is local debate as to the distinctiveness of the Dolgan language, with some arguing that it is a dialect of Yakut. In fact, there is a Western dialect of Dolgan (farther from Yakutia) and an Eastern style that is more similar to Yakut. I have documented many word substitutions in the Western dialect. For example, in the West they say "tyali," or language of the tundra people, but in the East they say "hakhali," the language of the Hakha people. Ust'-Avam is within the tyali-speaking population.

4. Nganasan is an endangered language, with fewer than one thousand speakers. The Nganasan were earlier known as the Tavgi Samoyed and Vadei Samoyed (Popov 1966), reflecting a similar distinction between Western and Eastern language communities. Nganasan is really a misnomer begun by Soviet ethnographers—it means "man." In Nganasan, they call themselves Nya (people).

5. Archival research (Ziker 2002a) showed that most of the 140 land allotments made from 1992 to 1997 (48 by indigenous people) were located in close proximity to the regional capital (Dudinka), along the Yenesei River or in proximity to Noril'sk.

6. Two player 1s were matched with the same player 2 for the purposes of figuring the final payoff in the UG. This final pair was matched at random.

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Chapter 14

Gifts or Entitlements: The Influence of Property Rights and Institutions for Third-Party Sanctioning on Behavior in Three Experimental Economic Games

Carolyn K. Lesorogol

Social norms and their enforcement play an important role in maintaining social order, particularly in small-scale societies where the reach of the central state is limited. Although norms are thus functional in this sense, it is less clear how and why individuals act to enforce norms, particularly when enforcement entails costs to the enforcer while the gains from enforcement extend to all members of the group. A number of scholars have posited the presence of a human trait (perhaps with a genetic component), termed “strong reciprocity” or “altruistic punishment,” to explain the presence of costly punishment (or cooperative) behavior (Fehr and Fischbacher 2003; Fehr, Fischbacher, and Gächter 2002; Gintis 2000; Gintis et al. 2008). The evidence from experimental economic games that has been offered in support of these arguments demonstrates that individuals behave altruistically in laboratory settings, where concerns about reputation and future interactions do not apply.

This chapter reports on field experiments conducted in Samburu District, Kenya, in 2003. Players in these experiments demonstrated concerns for fairness as well as costly sanctioning behavior in the dictator game (DG), the strategy method ultimatum game (UG), and the third-party punishment game (TPG). Thus, they tended to support the notion of strong reciprocity. However, examination of the patterns of offers and sanctions suggests that these may be related to how players interpreted ownership in the games and whether they viewed offers as gifts or entitlements. Furthermore, differences in the patterns of punishment in the UG and TPG may also be explained by Samburu notions of social sanctioning and the role of third-

versus second-party enforcement of norms. Thus, although it may be the case that a general trait for altruistic punishment and cooperation exists, these results suggest that extant social norms and local institutions influence play even in abstract games under carefully controlled field conditions. It may be difficult to control for reputation effects and expectations about future interactions, but the fact that games may cue particular social institutions provides insight into how these institutions function in the real world.

ETHNOGRAPHIC BACKGROUND: SAMBURU LIVESTOCK PRODUCTION, COOPERATION, AND INVOLVEMENT IN MARKETS

The Samburu are Nilotic-speaking pastoralists living in the north-central part of Kenya. They primarily herd cattle, sheep, and goats, although camels are becoming increasingly common in the district, partly as an adaptation to drought. Samburu are patrilineal and, in general, patrilocal. Settlements (nkangitie) normally consist of a man and his wife or wives and closely related households, especially agnatic kin. It is not unusual for affines or even friends from other clans to live together for a time in a settlement for a variety of reasons, including access to material support from better-off individuals.

The degree of mobility for Samburu depends largely on environmental conditions. Samburu District is physically divided between lowlands and highlands. The lowlands are quite arid (annual average rainfall is about 200 millimeters), with scrub bush vegetation, while the highlands are wetter (about 500 millimeters in average annual rainfall) and grasslands predominate. People are more mobile in the lowlands and may move their entire settlement several times a year, according to the availability of grazing and water resources. Highland Samburu are more sedentary and tend to move livestock seasonally while maintaining a more or less permanent home-base settlement. Samburu also move between the highlands and lowlands, especially during periods of drought or a prolonged dry season.

Regardless of the pattern of mobility, cooperation in herding is widespread. Households often combine herds on a daily basis, especially

cattle, in order to share herding labor and achieve economies of scale. When livestock move to dry-season camps, they are accompanied by young men (lmurran, or warriors), and there is a greater level of cooperation among households than for daily herding. Cooperation extends beyond herding to other daily activities. For example, women share many domestic duties with co-wives and women from other households within their settlements and from neighboring settlements. Older women watch small children while firewood is collected by younger women, who, in exchange, bring back firewood for the older ones. If one woman is going to town to make purchases, other women will give her money and instructions on what they want her to buy, and she will deliver it to them, literally on her back. House-building is a major task for women, especially in the highlands, where houses are becoming larger and more substantial. Women cooperate in collecting building materials and in constructing the house itself. The woman receiving the help often reciprocates in kind and also provides tea or food and, more recently, sometimes cash payment.

Among Samburu, livestock are owned individually (although more than one individual may have rights in a single animal), but land is managed collectively. The Samburu system meets most of the criteria set forth by Elinor Ostrom (1990) for effective management of a common-pool resource: both rules on access and use and monitoring systems are in place, and graduated sanctions for violators are specified and enforced. This system is generally effective, but there is ongoing change to it, spurred recently by government efforts since the 1970s to adjudicate land. In the highlands, land adjudication has taken the form of granting title to land to groups of households residing in specified areas. In a few cases, title was granted to individuals, and in one community all resident households were given equal-sized parcels of land after a long dispute over ownership rights (Lesorogol 2003, 2008). The trend toward land adjudication and titling raises questions about the future of cooperative land management in this region.

Livestock remain the basis of subsistence and household wealth and income for most Samburu, but there is ample evidence of increasing diversification of the economic base (Holtzman 1996; Lesorogol 2008). Population growth, persistent drought, and reduced mobility have combined to reduce per capita livestock holdings over the last fifty years. In response, many men have left the area in search of wage work in other parts of the

country, notably as watchmen in the capital city, Nairobi. Women are also engaged in income-generating activities, especially petty trade (sugar, tea, soap, tobacco, alcohol) out of their homes and the sale of natural resources such as firewood, building poles, and charcoal. Some households have begun to cultivate crops, primarily maize and beans, for both home consumption and sale, particularly in higher-rainfall areas where agriculture is somewhat less risky (although data on yields indicate that risks are considerable, even in the best-suited places) (Republic of Kenya 2001).

Along with these strategies, most Samburu sell some of their own livestock in local markets and use the cash to purchase food and other necessities and to pay for education and health services. Livestock trading is a popular pursuit, especially for younger men who are able to travel the long distances required to buy and sell livestock. Rapid market fluctuations make trading very risky, however, and accessing initial capital can be a challenge to many who would like to be engaged in trade. Clearly, Samburu people are increasingly reliant on markets, both local ones and more distant ones (for example, the capital city of Nairobi, four hundred kilometers away) for their livelihood. There is a gradient of involvement with markets that mimics the environmental divide between highlands and lowlands: people in the highlands are closer to markets and more engaged with them, while those in the lowlands are farther away from markets and appear to be less reliant on them (Straight 1997).

THE STUDY COMMUNITY

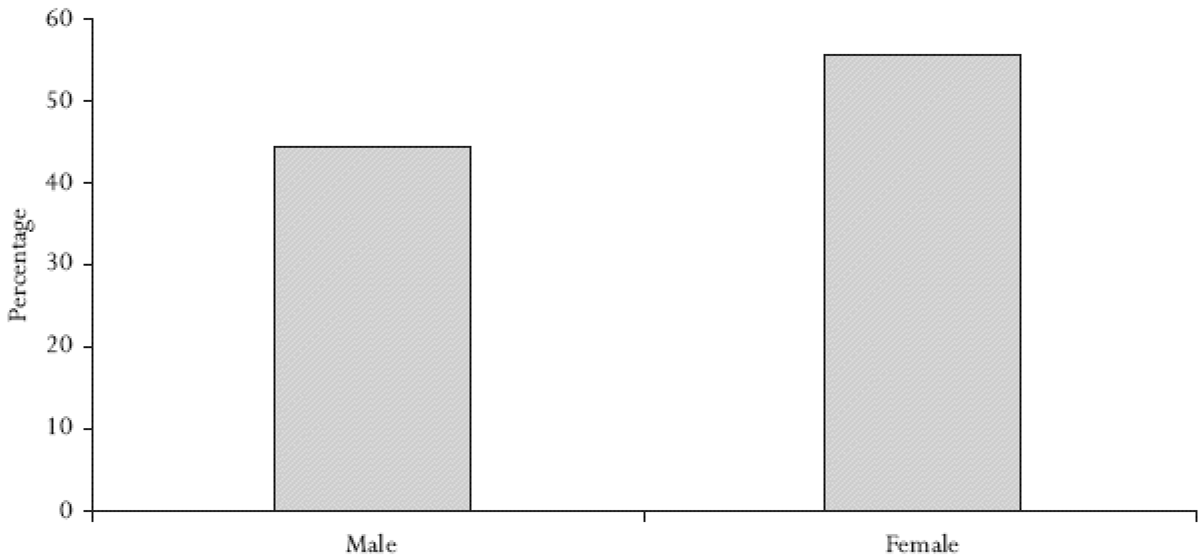
Mbaringon (“rocky place”) is located in the highlands of Samburu District, about twenty-five kilometers from Maralal, the district capital. A smaller town, Kisima, is located on the western edge of Mbaringon. In the 1970s, Mbaringon became a group ranch, and today it has over six hundred members, representing virtually all males in the area, including many under the age of eighteen. In a network survey conducted as part of this study, just over 380 households were contacted. Average household size in Mbaringon was about 10 in a 2000–2001 survey, implying a population of about 3,800.[1] The group ranch covers an area of roughly seventy-five square kilometers. Mbaringon members of the group ranch have joint title to the land, and an elected committee is responsible for group ranch affairs. However, day-to-day livestock management remains at the discretion of

individual herders in cooperation with the local council of elders, who regulate access to certain high-value resources, including a forest and permanent water springs. There are no fences or obvious boundaries around the group ranch. About thirty or forty individuals have built fences around small plots (less than an acre) where they sometimes grow crops or keep their young livestock, but these are the exception, not the norm.

METHODS

The core package of games—the dictator game, the strategy method ultimatum game, and the third-party punishment game—was played in Mbaringon in 2003, according to the agreed-upon protocols of the cross-cultural project. The only deviation was in not holding postgame interviews following the TPG: additional games (the double-blind dictator game and the trust game) were played subsequent to the core package, and I did not want to contaminate the player pool by asking questions about the games already played. I had conducted games before in Mbaringon as part of another research project in 2001. However, none of the players in the 2003 round had played in 2001, the UG had not been played here before, and the TPG was played according to a different protocol. Given the time that had elapsed and the differences in players and game details, I do not believe that contamination or collusion was present in Mbaringon.

FIGURE 14.1 *Sex of Mbaringon Participants in Games*



Source: Author's compilation based on author data.

The games were conducted at the local primary school, where several rooms and a shady outdoor area were made available in order to separate the players from each other as necessary. Twelve research assistants were on hand to conduct pregame interviews and to monitor people to ensure that they did not discuss the games while waiting.

PLAYER CHARACTERISTICS

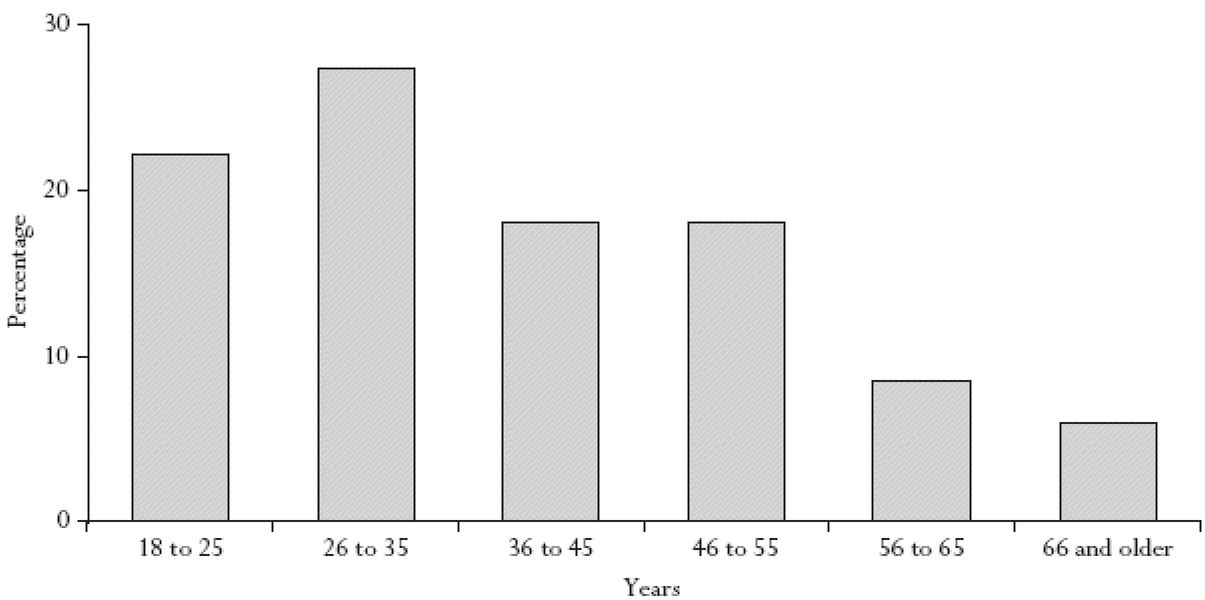
Figures 14.1 to 14.7 illustrate some of the demographic characteristics of the 117 players in the games conducted in Mbaringon. Notable among these characteristics are participants' low levels of education: the mean years of education was 1.4, and more than 70 percent of the players had no formal education. In spite of that, about 60 percent of participants reported speaking the national language, Swahili, either a little or a lot. Language acquisition generally indicates involvement with markets or towns, where people pick up the language even without formal education. Note also that individual income and per capita wealth are heavily skewed toward lower levels, reflecting the generally low levels of income and wealth in the population.

RESULTS

The Dictator Game

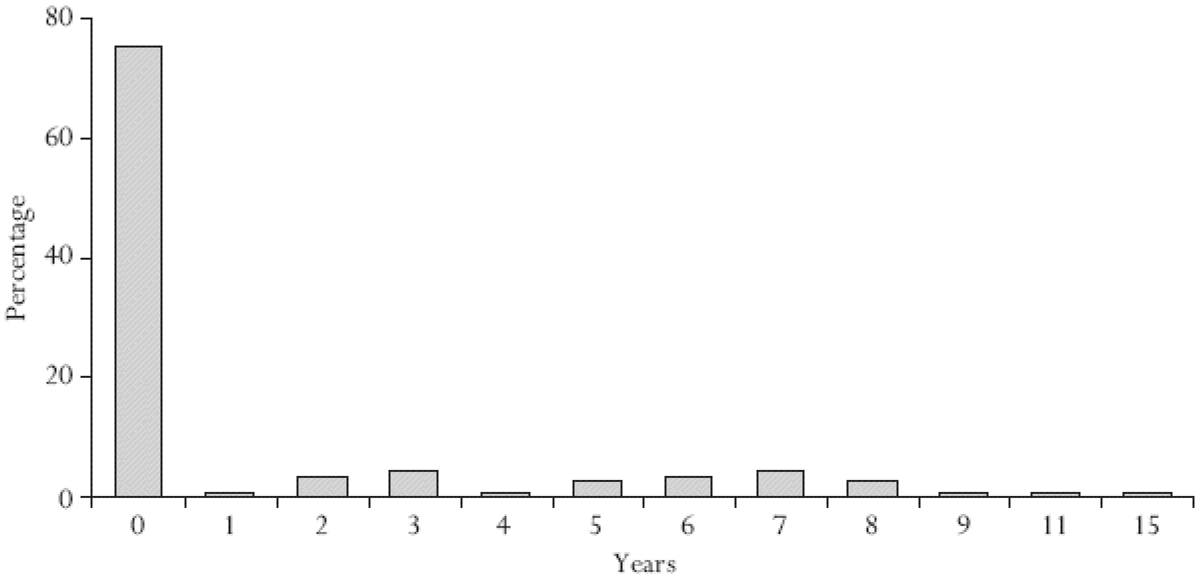
The dictator game asks player 1 to split a pot of money (the stake) with an anonymous player 2. In this case, the stake was 100 Kenyan shillings, equivalent to a day's manual labor wage in this area. Mainstream economic assumptions predict that player 1 will keep all the money and give nothing to player 2, as this is in his or her interest and, given the anonymity of the game, player 1's decision will remain unknown to player 2 and to others in the community. Offers greater than zero indicate a concern for fairness. In the United States, offers usually cluster around 0 and 50 percent of the stake (Camerer 2003). Among the thirty-one Mbaringon players, the mean DG offer was 40 percent of the stake (40 shillings), with a minimum of 0 shillings and a maximum of 90 shillings (standard deviation = 23.238).

FIGURE 14.2 *Age of Mbaringon Participants in Games*



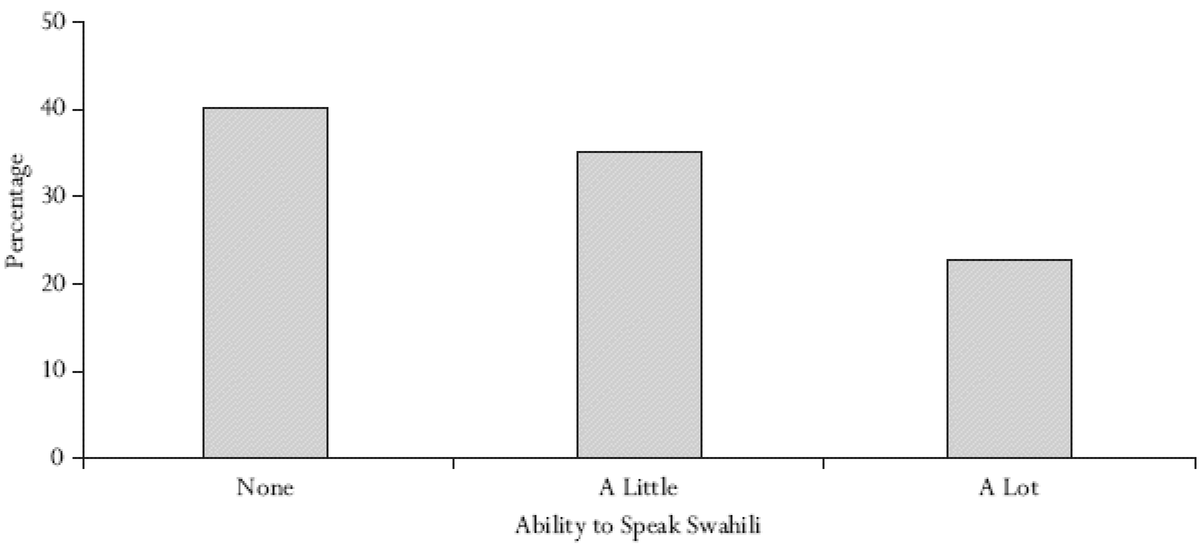
Source: Author's compilation based on author data.

FIGURE 14.3 *Years of Schooling in Mbaringon Sample*



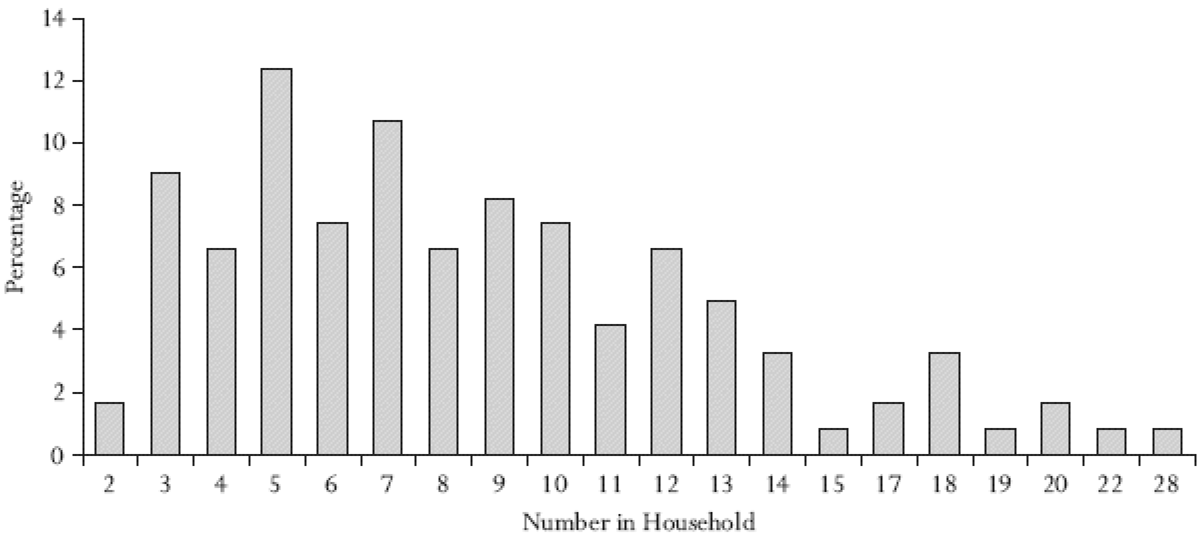
Source: Author's compilation based on author data.

FIGURE 14.4 *National Language Proficiency in Mbaringon Sample*



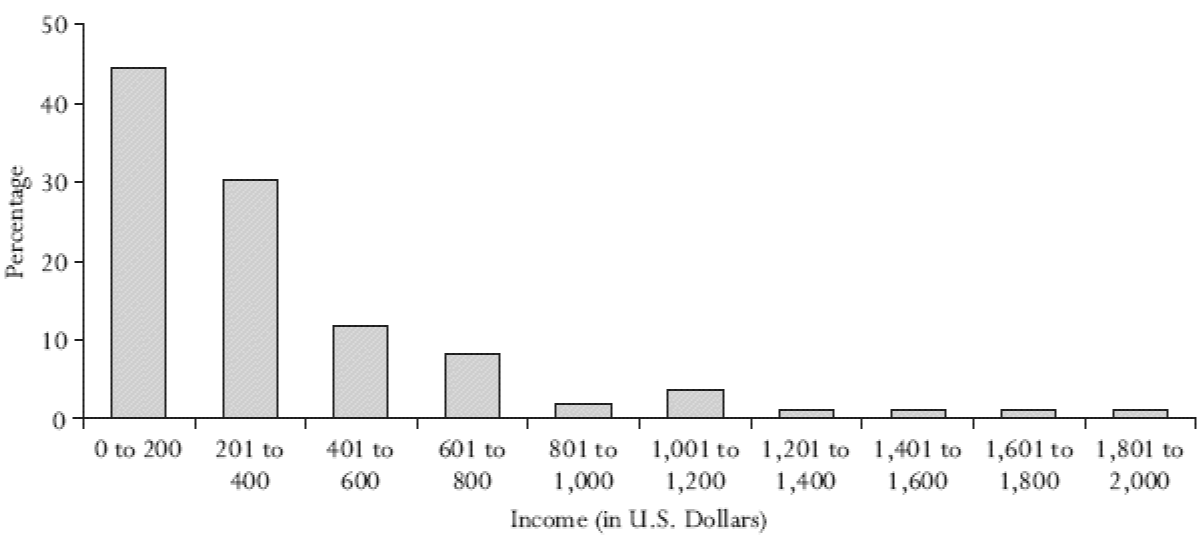
Source: Author's compilation based on author data.

FIGURE 14.5 *Household Size in Mbaringon Sample*



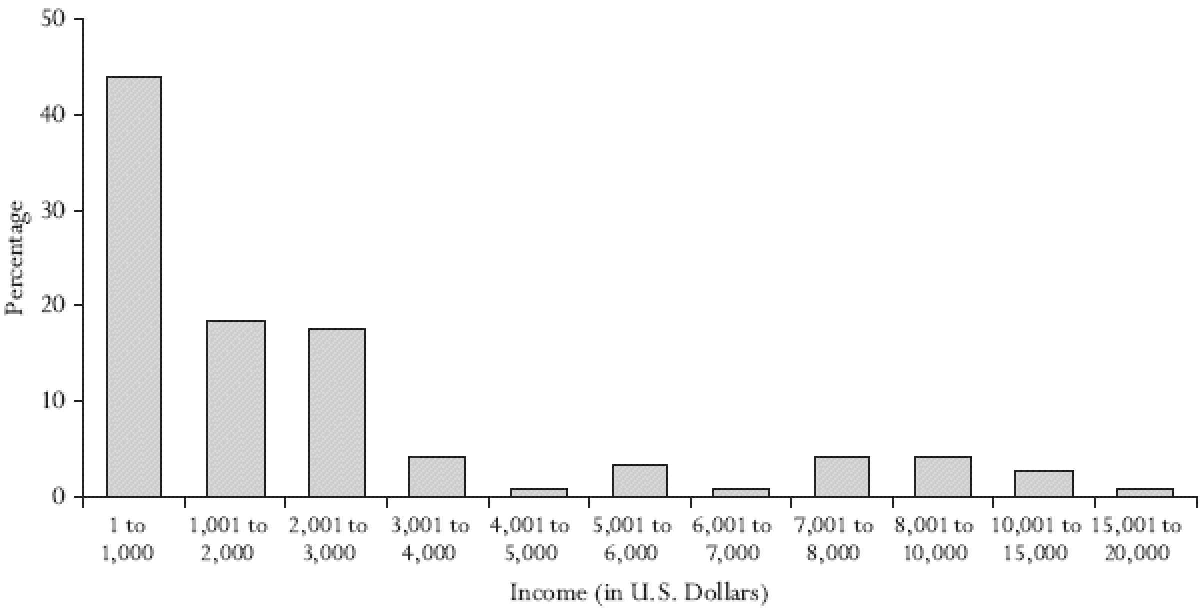
Source: Author's compilation based on author data.

FIGURE 14.6 *Individual Total Annual Income in Mbaringon Sample*



Source: Author's compilation based on author data.

FIGURE 14.7 *Total Household Wealth in Mbaringon Sample*



Source: Author's compilation based on author data.

Although offers spanned a wide range (0 to 90 percent), they approximated a normal distribution. Player 1s clearly exhibited a concern for fairness in the high number of positive offers they made in the DG. The wide spread of offers suggests, however, that there was no clear norm for offers in this game, a subject to which I return later. Figure 14.8 shows that the modal offer was 30 percent while there were six offers greater than 50 percent. These hyper-fair offers are somewhat surprising and unprecedented in this population, where the DG was played in 2001. I suspect that a few of these individuals were motivated to give such high offers in order to impress this investigator, owing to their position in the community and their own particular extenuating circumstances.

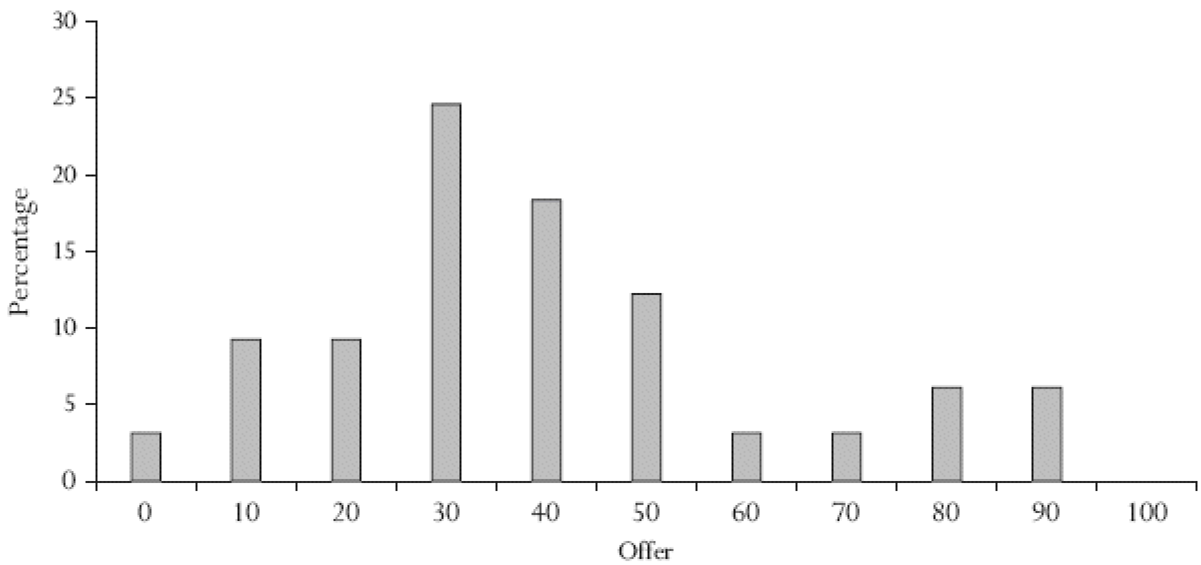
It is interesting to note that the offers in the DG in 2003 were significantly higher than they were in 2001. Table 14.1 gives the results of a Mann-Whitney nonparametric test indicating a significant (p = 0.004) difference in the distributions of offers. This difference may have been due to improved environmental conditions in 2003. In 2001, Mbaringon was just starting to recover from a devastating drought in 2000, whereas rainfall was above average in 2003. It is possible that their improved welfare made

people more generous (see also chapter 12, this volume, available at: http://www.russellsage.org/Ensminger).

The Strategy Method Ultimatum Game

Patterns in the Offers In Mbaringon, the same thirty-one players played the strategy method UG game immediately following the DG, and they retained the same roles. The mean player 1 offer in the UG was 35.16 shillings (35.16 percent of the stake), with a minimum of 10 percent and a maximum of 80 percent (standard deviation = 19.126). This mean offer is lower—but not significantly so—than the mean offer in the DG. Table 14.2 shows the results of a Mann-Whitney test comparing offers in the DG and the UG.

FIGURE 14.8 *Mbaringon Offers in the Dictator Game*



Source: Author's compilation based on author data.

TABLE 14.1 *Mann-Whitney Test on Dictator Game Offers in Mbaringon, 2001 and 2003*

Year	N	Mean Rank	Sum of Ranks	Offer
Ranks				
DG offer in 2001	2	25.50	816.00	
DG offer in 2003	1	38.71	1,200.00	
Total	3			
Test statistics[a]				
Mann-Whitney U				288.000
Wilcoxon W				816.000
Z				−2.912
Asymptotic significance (two-tailed)				0.004

Source: Author's compilation based on author data.
a. Grouping variable: year.

TABLE 14.2 *Mann-Whitney Test on Dictator Game and Ultimatum Game Offers in Mbaringon*

Offers Player 1	N	Mean Rank	Sum of Ranks	Offer
Ranks				
UG-offer	31	30.00	930.00	
DG-offer	31	33.00	1,023.00	
Total	62			
Test statistics[a]				434.000
Mann-Whitney U				930.000
Wilcoxon W				−0.663
Z				0.507
Asymptomic significance (two-tailed)				

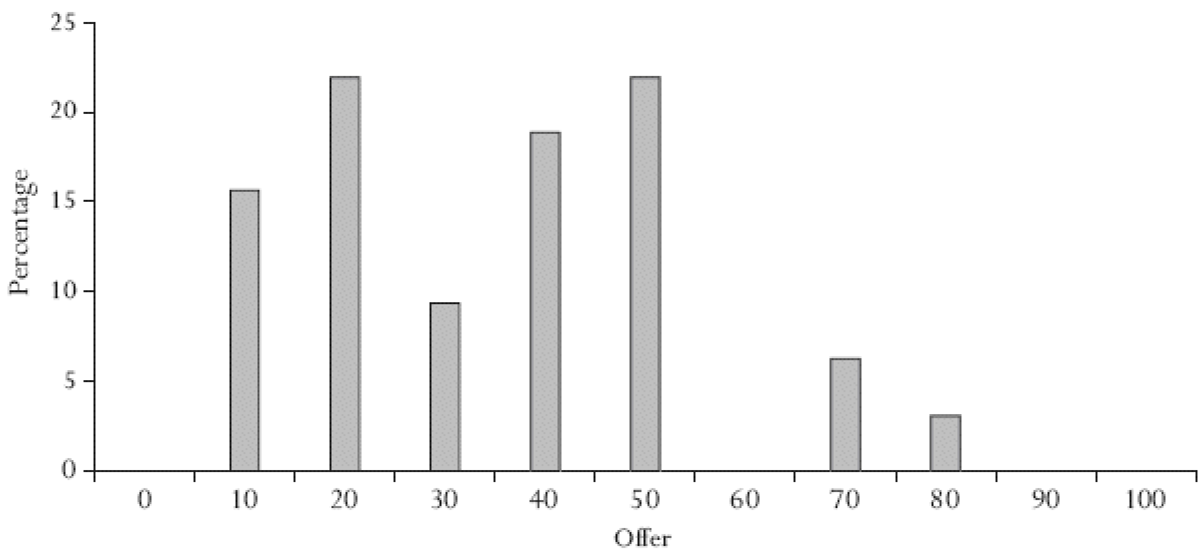
Source: Author's compilation based on author data.
a. Grouping variable: Player 1 offers in DG and UG.

While the distributions are not significantly different, there is considerable difference in the shape of the distribution in offers between the two games (figure 14.9). Notably, the distribution changes from close to normal to a bimodal distribution with peaks at 20 and 50 percent. Also, the six hyper-fair offers in the DG are reduced to three in the UG. There is no simple pattern, however, to these changes. Indeed, fourteen players reduced their offers from the DG to the UG, including all six hyper-fair offers in the DG, which fell by an average of thirty-two percentage points. Seven offers remained the same, while ten offers increased. Eight out of the ten increases were from offers of 30 percent or less. Overall, low offers (less than 30 percent) increased much more often (eight out of thirteen, or 62 percent) than they fell (two out of thirteen, or 15 percent). These shifts in offers are

not captured very well in bivariate correlations, which show no significant correlation between offers in the DG and the UG (figure 14.10 and table 14.3).

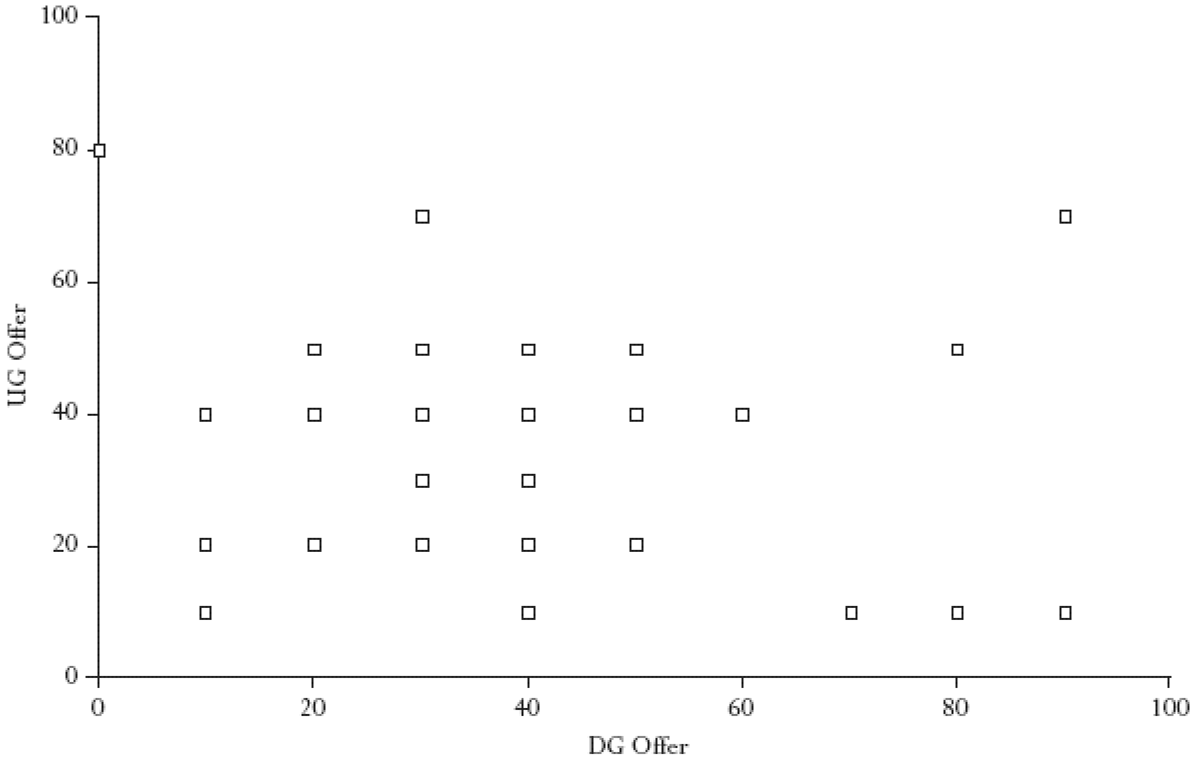
A closer examination of the pattern of offers suggests that player 1s who made relatively low offers in the DG increased their offers in the UG (perhaps fearing rejection), while those who made hyper-fair offers in the DG invariably reduced their offers in the UG, sometimes by large margins—for example, from 80 or 90 percent to 10 percent. One plausible explanation for this behavior is that these players realized that they had not gained much through their generosity in the DG and decided to recoup something in the UG.[2] Thus, while there is no clear correlation between offers in the two games, there are indications that players' strategies shifted between the two games. Edwins Laban Gwako (chapter 12, this volume, available at: http://www.russellsage.org/Ensminger) found a similar pattern of offers between the DG and the UG in the Maragoli and Gusii populations in Kenya, including evidence from interviews that player 1s were averaging their returns across the two games.

FIGURE 14.9 *Mbaringon Ultimatum Game Offers (N = 31)*



Source: Author's compilation based on author data.

FIGURE 14.10 *Scatter Plot of Mbaringon Dictator Game and Ultimatum Game Offers*



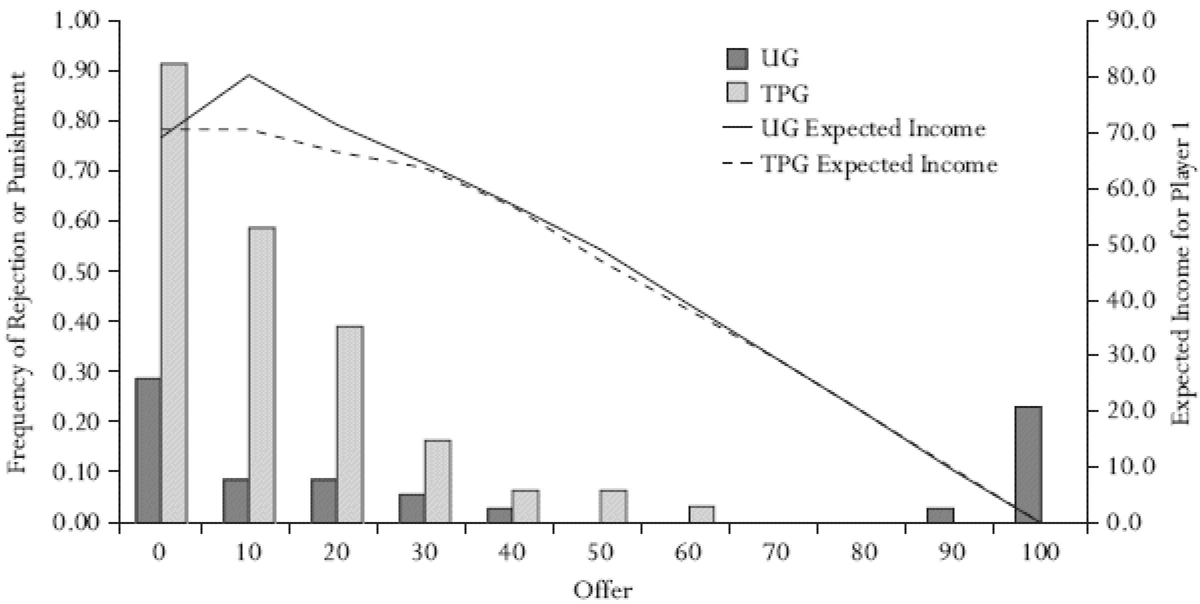
Source: Author's compilation based on author data.

TABLE 14.3 *Correlations of Dictator Game and Ultimatum Game Offers in Mbaringon, 2003*

	DG Offer	Player 1 UG Offer
DG offer: Pearson correlation	1%	−0.090
DG offer: Significance (two-tailed)	—	0.630
N	31	31

Source: Author's compilation based on author data.

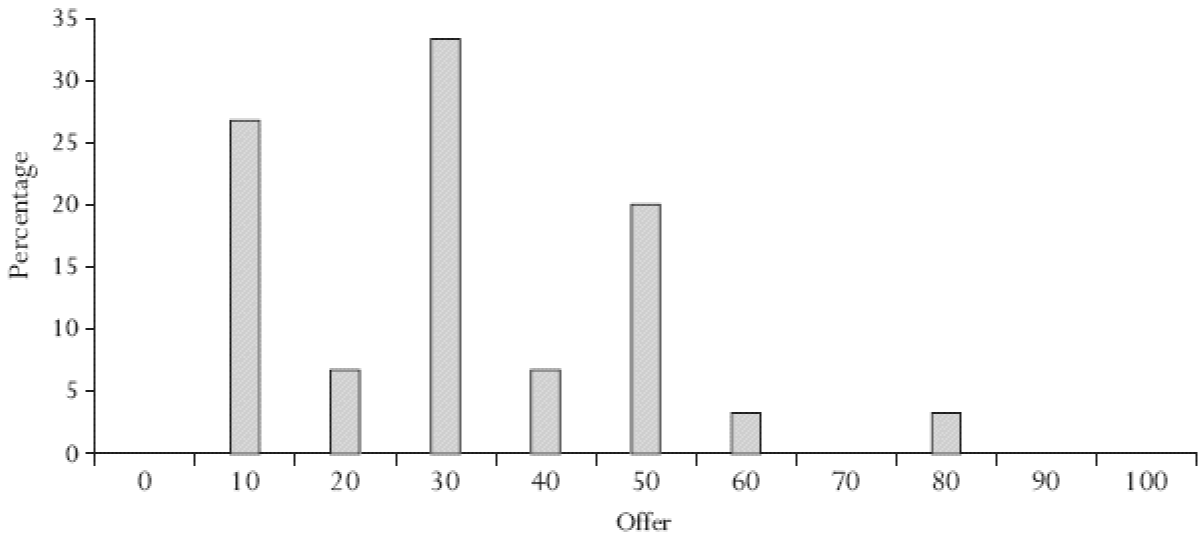
FIGURE 14.11 *Mbaringon Rejections and Expected Income in the Ultimatum Game and the Third-Party Punishment Game*



Source: Author's calculations based on author data.

Patterns of Rejection in the Strategy Method Ultimatum Game Player 2s had the choice of rejecting the offers made by player 1s in the UG. In the strategy method version of this game, player 2 is asked whether he or she would accept or reject each possible offer before player 1's actual offer is revealed. Figure 14.11 shows the percentage of player 2s who rejected each possible offer. Thirty-two percent of player 2s rejected offers of zero, while 10 percent rejected offers of 10 or 20 percent. From that point, rates of rejection fell: all player 2s accepted offers of 50 through 80 percent. Interestingly, some player 2s rejected hyper-fair offers as well; 26 percent rejected offers of 100 percent. These players commented while they were playing the game that it was not fair or right for player 1 to give them the entire stake, because they believed that the stake should be divided fairly (evenly) between the two players (for similar results in a Chinese experiment, see Hennig-Schmidt et al. 2008). In actual play, none of the pairs of players ended up with zero. That is, there were no cases where player 1's offer was lower than what player 2 would accept.

FIGURE 14.12 *Mbaringon Offers in the Third-Party Punishment Game (N = 30)*



Source: Author's compilation based on author data.

The Third-Party Punishment Game

The third-party punishment game provides an opportunity for a third player to take action regarding an offer from player 1 to player 2 in a game identical to the dictator game. In this protocol, player 3 can either do nothing about player 1's offer or respond by paying 10 shillings (out of 50 shillings allocated to player 3) in order to punish player 1; when player 3 pays 10 shillings, 30 shillings are deducted from player 1's takings. As in the strategy method UG, the TPG was played using the strategy method to elicit player 3's decisions about sanctioning prior to revealing player 1's actual offer. New players were recruited for the TPG, none of whom had played in the previous day's DG and UG.

Given the possibility of punishment in this game, we would expect the mean to be higher than in the DG and perhaps similar to the mean in the UG. The mean player 1 offer in the TPG (N = 30) was 31.33 (standard deviation = 17.953), with a minimum of 10 percent and a maximum of 80 percent. This mean was lower than the means in DG and the UG. In contrast to the DG and the UG, there were only two hyper-fair offers in the TPG.

The pattern of offers (figure 14.12), reveals a mode at 30 percent and secondary modes at 10 and 50 percent. It appears that a sizable number of players (more than 25 percent) were confident that even offers of 10 would not be punished. In fact, eighteen player 3s (60 percent) did say that they would punish offers of 10, and in three cases this led to a reduction of player 1's takings. Three other actual punishments occurred on offers of 30 percent. In that case, only five player 3s (17 percent) said that they would punish offers of 30, but three out of the five were paired with player 1s who made offers of 30 (the modal offer).

The pattern of punishment behavior in this game is interesting compared to that in the ultimatum game. Player 3s in the TPG were far more likely to punish low offers by player 1s than were player 2s in the UG. For example, while 93 percent of player 3s in the TPG said that they would punish offers of zero, only 32 percent of player 2s in the UG said that they would reject zero offers. This means that player 3 in the TPG was willing to suffer a loss of 10 shillings in order to punish player 1 while player 2 in the UG was unwilling to reject a zero offer even though it would have been costless for him or her to do so. Punishment rates in the TPG of offers of 10 (60 percent) and 20 (40 percent) were much higher than rejection rates of the same offers in the UG, which were only 10 percent for offers of 10 and 20. On the other hand, no player punished high offers in the TPG, while offers of 90 and 100 were sometimes rejected in the UG, possibly because of the way the game was set up: there was no way for player 3 to punish player 2 for receiving too much of the stake.

Explaining Variation in Offers

Individual Demographic Measures To test for the influence of individual-level demographic characteristics on offers, linear regressions were conducted on offers in the three games. The dependent variable in each case was the offer percentage, and the independent variables were age, sex, years of education, individual total annual income, household wealth, and household size.

Each independent variable was removed from the regression sequentially if it was not significant in the first model. Tables 14.4, 14.5, and 14.6 show that on the whole the individual-level demographic variables were not good predictors of offers in the games.

I also tested for the influence of individual-level demographic variables on rejection behavior in the strategy method UG. For this, I constructed a variable, the minimum acceptable offer (MinAO)—the lowest offer that was accepted by player 2—which became the dependent variable in the regression. In this case, age is a predictor of MinAO (table 14.7). Older players were more likely to have higher MinAOs (that is, to reject low offers) than younger players, a finding that was robust across all the models. In the full model, a one-standard-deviation (14.6) change in age leads to a seven-percentage-point change in the MinAO. A bivariate Pearson correlation of age and MinAO reveals a 33 percent correlation, which is significant at the 0.05 level. Age is also a significant predictor of lowest unpunished offers (LUOs) in the TPG (table 14.8).[3] In the full model, a one-standard-deviation change in age results in a 9.3-percentage-point difference in the LUO. As in the UG, older players were more likely to punish low offers. These results suggest that older players tend to uphold norms of fairness to a greater extent than younger players and that they are willing to incur costs to do so.

DOES CUEING OF CULTURALLY SPECIFIC INSTITUTIONS EXPLAIN VARIATIONS IN BEHAVIOR?

A number of explanations have been offered for the presence of altruistic punishment behavior, as observed here, where players incur costs to sanction other players who behave contrary to norms of fairness. In general, these explanations posit that altruistic punishment, or strong reciprocity, is a means to enforce adherence to social norms and thereby enhance the possibilities for human cooperation (Fehr and Fischbacher 2003, 2004; Fehr, Fischbacher, and Gächter 2002; Gintis 2000). Ernst Fehr and Urs Fischbacher (2004, 77) also compare second- and third-party punishment in games that are closely analogous to the strategy method UG and TPG discussed here. They find that players are much more likely to punish violations of norms that affect them directly (second-party enforcement) than those to which they are merely witness (third-party enforcement). They reason that this difference is due to the higher costs of low offers to beneficiaries as opposed to third parties and the negative psychological effects associated with low offers (80). It is intriguing, then, that in the

games reported here, player 2s in the UG were less likely to punish than player 3s in the TPG, even when offers were low and the costs of punishment were low or zero (in the case of zero offers in the UG).

TABLE 14.4 *Linear Regressions of Mbaringon Dictator Game Offers, 2003*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−0.55					
	(4.41)					
Female	16.99	16.97				
	(11.10)	(10.82)				
Education	5.91	6.01*	5.20			
	(3.64)	(3.46)	(3.54)			
Individual income	5.21	5.16	3.36	3.46		
	(3.44)	(3.34)	(3.24)	(3.12)		
Household wealth	−9.20	−9.09	−5.91	−4.59	−3.20	
	(5.92)	(5.71)	(5.52)	(5.53)	(5.49)	
Household size	−5.43	−5.45	−4.90	−7.26	−9.67*	−10.50**
	(5.59)	(5.45)	(5.63)	(5.52)	(5.42)	(5.17)
Constant	45.00***	43.41***	47.28***	53.65***	60.46***	59.78***
	(17.37)	(11.50)	(11.61)	(11.05)	(10.47)	(10.28)
Observations	26	26	26	26	26	26
Model significance	0.20	0.12	0.17	0.27	0.13	0.05
Adjusted R-squared	0.13	0.17	0.11	0.04	0.07	0.10

Source: Author's compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

TABLE 14.5 *Linear Regressions of Mbaringon Ultimatum Game Offers, 2003*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	2.50					
	(3.69)					
Female	4.86	4.97				
	(9.29)	(9.16)				
Education	3.47	3.02	2.78			
	(3.04)	(2.93)	(2.84)			
Individual income	−3.09	−2.88	−3.40	−3.01		
	(2.88)	(2.82)	(2.61)	(2.39)		
Household wealth	5.48	4.99	5.92	6.19	3.78	
	(4.95)	(4.83)	(4.44)	(4.24)	(4.76)	
Household size	−6.29	−6.19	−6.03	−7.14	−3.55	−2.57
	(4.68)	(4.61)	(4.52)	(4.29)	(4.70)	(4.50)
Constant	33.51**	40.75***	41.89***	45.27***	39.04***	39.84***
	(14.53)	(9.73)	(9.34)	(8.48)	(9.08)	(8.96)
Observations	26	26	26	26	26	26
Model significance	0.48	0.40	0.29	0.19	0.63	0.57
Adjusted R-squared	−0.01	0.02	0.05	0.08	−0.04	−0.03

Source: Author's compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test

TABLE 14.6 *Linear Regressions of Mbaringon Third-Party Punishment Game Offers, 2003*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−4.03					
	(3.92)					
Female	−9.04	−9.12				
	(8.79)	(8.80)				
Education	2.19	3.05	2.68			
	(4.31)	(4.23)	(4.23)			
Individual income	−0.27	−0.42	3.42	4.30		
	(7.11)	(7.12)	(6.09)	(5.65)		
Household wealth	−0.14	2.70	0.22	−1.94	−0.183	
	(8.61)	(8.17)	(7.82)	(7.08)	(6.64)	
Household size	−4.54	−6.73	−4.93	−4.56	−5.11	−5.22
	(5.94)	(5.55)	(5.28)	(5.10)	(5.00)	(3.30)
Constant	53.27***	45.56***	34.95***	37.16***	40.39***	40.43***
	(15.21)	(13.26)	(8.45)	(8.08)	(6.82)	(6.57)
Observations	29	29	29	29	29	29
Model significance	0.54	0.55	0.57	0.42	0.31	0.13
Adjusted R-squared	−0.03	−0.03	−0.04	−0.001	0.01	0.05

Source: Author's compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
***Coefficient significant at < 0.01 level in two-tailed test

TABLE 14.7 *Linear Regressions of Mbaringon Minimum Acceptable Offers in the Ultimatum Game, 2003*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	7.07**	5.13**	5.00**	4.55*	4.59*	4.29*
	(2.75)	(2.50)	(2.45)	(2.42)	(2.36)	(2.31)
Female	7.97					
	(5.28)					
Education	1.66	1.42				
	(2.34)	(2.40)				
Individual income	3.28	2.38	2.12			
	(2.13)	(2.10)	(2.03)			
Household wealth	−1.89	−1.71	−1.09	−0.43		
	(3.02)	(3.10)	(2.88)	(2.81)		
Household size	−0.64	0.009	−0.54	−1.17	−1.41	
	(2.73)	(2.77)	(2.58)	(2.51)	(1.89)	
Constant	−18.32	−10.00	−8.08	−3.84	−3.84	−5.85
	(10.62)	(9.31)	(8.61)	(7.61)	(7.47)	(6.91)
Observations	30	30	30	30	30	30
Model significance	0.30	0.42	0.32	0.30	0.16	0.07
Adjusted R-squared	0.06	0.006	0.03	0.03	0.06	0.08

Source: Author's compilation based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

**Coefficient significant at < 0.05 level in two-tailed test

*Coefficient significant at < 0.10 level in two-tailed test

TABLE 14.8 *Linear Regressions of Mbaringon Lowest Unpunished Offers in the Third-Party Punishment Game, 2003*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	9.29*	9.36*	9.74**	9.62**	9.06**	5.56*
	(4.68)	(4.80)	(4.09)	(3.98)	(3.68)	(3.10)
Female	17.79*	16.82*	15.36	15.43	14.68	
	(9.69)	(9.91)	(9.40)	(9.21)	(8.88)	
Education	−6.93					
	(4.75)					
Individual income	−7.13	−8.23				
	(8.06)	(8.22)				
Household wealth	3.64	1.70	0.69			
	(3.39)	(3.20)	(3.06)			
Household size	−3.68	−3.70	−1.86	−1.26		
	(4.20)	(4.31)	(4.11)	(3.07)		
Constant	−7.30	−6.18	−14.16	−14.45	−14.49	6.94
	(20.36)	(20.86)	(16.09)	(15.73)	(15.48)	(8.71)
Observations	28	28	28	28	28	28
Model significance	0.16	0.20	0.24	0.13	0.06	0.08
Adjusted R-squared	0.14	0.10	0.07	0.10	0.13	0.07

Source: Author's compilation based on author data.
Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

A possible explanation for this pattern of punishment is the manner in which the structure of the game itself influences behavior rather than a propensity toward altruistic punishment per se. Specifically, the game structure may remind individual players of particular social situations and the institutionalized rules that apply to those situations (Henrich and Henrich 2007, ch. 6). Such cueing effects of games have been noted by Jean Ensminger (2000) and by Gary Bolton, Elena Katok, and Rami Zwick (1998). In this case, Samburu patterns of dispute resolution and property rights might help explain why people were more willing to deploy third-party punishment in the TPG than second-party punishment (rejection) in the UG. It is common in Samburu society to settle disputes by fining individuals who are guilty of violating rules or norms (for example, for grazing infractions, violation of age-grade rules, theft, assault, and marital disputes). In these cases, fines are imposed by a council of elders—a third party—and are either transferred to the injured party (interpersonal disputes) or consumed by the community as a whole (grazing fines). Since

these types of infractions and sanctions are relatively common occurrences, individuals are quite used to playing a role as a third party and exacting a fine, as in the TPG.

Rejecting a gift, however, is another story. If the game situation was construed as receiving a gift (rather than an entitlement) from someone else, then rejecting even a low offer would be tantamount to refusing a gift, which is quite unusual among Samburu. Gift giving and receiving are important bases for reciprocity in the community, and individuals invest fairly heavily in developing and maintaining networks of reciprocity (Lesorogol 2009). To the extent that offers are perceived to be gifts, low rates of rejection or punishment would be consistent with Mbaringon social norms regarding gifts.

I have argued elsewhere (Lesorogol 2005) that the ambiguity of property rights in the dictator game may affect play (see also Engel 2011; Hoffman et al. 1994; Hoffman, McCabe, and Smith 2000; Hoffman and Spitzer 1985). That is, even though the game instructions stipulate that the stake is allocated to the pair of players, player 1 is given authority to decide how the money is divided between him- or herself and player 2. In this sense, it is possible to construe ownership as residing more with player 1 than with player 2, a condition that also holds in the UG and the TPG (with the caveat that player 2 can reject low offers in the UG and player 3 can sanction player 1 in the TPG—conditions that do not apply in the DG).

If player 1 perceives him- or herself as having ownership rights over the stake, then offers are gifts, not entitlements, and low offers would be acceptable to both giver and receiver. This would explain why many player 2s accepted low offers. On the other hand, if ownership is construed as joint, then offers are more like entitlements than gifts, and low offers would be more likely to be rejected as a violation of fairness norms; this would explain why some players do reject offers up to 50 percent of the stake. Rejections of hyper-fair offers also make sense in the entitlement view, since hyper-fair offers violate the entitlement of player 1. Thus, a player 2 operating from an entitlement perspective may reject such high offers, reasoning that the money should not go disproportionately to either player 1 or player 2. There is also the chance that people reject high offers because they are reluctant to incur the obligations that might be attached to a large gift—as in David Tracer's (2003) Papua New Guinea case—but my understanding, from Samburu players' comments during the game, is that

rejections of hyper-fair offers had more to do with the entitlement perspective than with fear of incurring obligation. This ambiguity of property rights may help explain the wide range of offers, rejections, and punishments in all the games, since these depend on how each individual interprets ownership.

Given the setup of the UG and the TPG, I think it is likely that many players (but not all) interpret offers in the UG as gifts and are therefore unlikely to reject them. In the TPG, the role of player 3 is clearly defined as a third party to the transaction between player 1 and player 2. It is possible that this arrangement cues cultural patterns of third-party sanctioning by reminding players of third-party dispute resolution in general. If they therefore feel somewhat obligated to act in their capacity as a third-party observer, this may partly account for higher levels of punishment behavior compared to rejections in the UG. Further, if they interpret offers as entitlements, they are likely to punish low offers. The finding that older players were more likely to punish in the TPG and to reject low offers in the UG appears consistent with the hypothesis about cueing, because older individuals are more actively involved in the enforcement of social norms in real-life situations.

CONCLUSIONS

These results suggest that culturally specific institutions relating to notions of property rights and modes of sanctioning help explain behavior in economic games. That is, even though these were one-shot games with intersubject anonymity, Samburu players behaved as if they were in their own particular social context. An implication of this finding is that experimenters need to pay careful attention not only to framing effects (how game instructions are worded and presented) but also to contextual effects (how games resemble familiar cultural institutions). For example, it would be important to understand the extent to which players are consciously and strategically choosing a particular contextualization of the game (for example, as involving gifts or entitlements) that serves their own interests (economic or otherwise), or whether context enters the game unconsciously as players behave according to embedded social norms, as with the contextualized dictator game conducted among Samburu (Lesorogol 2007). The degree of intentionality may also differ among individuals, perhaps

systematically. Further investigation of these parameters in field experiments will provide insight into the interplay of cultural institutions and individual behavior.

NOTES

1. I think the population is somewhat less than 3,800 because a number of the households are young men who are just leaving their parents and getting married and do not have children.

2. Players were not paid until the completion of both games. However, player 1s knew what they were keeping from the DG even before the UG was played, since player 2s had no choice in that game and player 1s retained whatever they did not give to player 2s.

3. The regression was checked for the influence of outliers as well as effects of order of play.

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Chapter 15

Cooperation and Punishment in an Economically Diverse Community in Highland Tanzania

Richard McElreath

Previous cross-cultural variation in economic experiments was unexplained by individual-level variables such as wealth, income, gender, and education, even though variation across societies was explained by market integration and potential returns to cooperation (Henrich et al. 2001; Henrich et al. 2004). However, the previous data contained relatively poor measures of individual income, wealth, and market integration. Additionally, most of the societies sampled contained relatively small amounts of variation in these measures. Thus, we do not know if the absence of within-group effects is due to causal unimportance or to insufficient variation. In this chapter, I analyze the game behavior of an economically and ethnically diverse community in southern Tanzania that exhibits substantial variation in these measures. Nevertheless, I find very limited evidence that individual economic variables explain variation in game behavior, echoing the weak and inconsistent results found in other societies in this volume. These results cast doubt on the conjecture that the failure of individual-level variables to explain game behavior results simply from inadequate variation within each site. However, error in measurement might be responsible for the lack of explanatory power at the individual level, while the same variables are explanatory across groups.

A tremendous amount of data now exist supporting the conclusions that human behavior is poorly predicted by standard economic preferences (Camerer 2003; Fehr and Gächter 2002; Hoffman et al. 1998; Roth 1995). In addition, as more non-Western and nonstudent populations are sampled, it appears that no single revision to *Homo economicus* will be sufficient (Henrich et al. 2004), or at least that the variables that may eventually explain the tremendous amounts of variation in game behavior will fall outside existing theories.

Adequately addressing the role of individual-level variables such as income and education, however, requires good measures of these variables, and this is complicated by the broad cross-cultural nature of the data. It may not be reasonable to suggest that education or income has the same role in all groups. Nevertheless, it is reasonable to ask if such variables have powerful effects on game behavior in any significant proportion of the groups sampled. If so, then it will be more reasonable to infer that across-group variation may be a function of the same variables. Previous attempts at correlating cross-cultural game behavior with individual-level variables has met with failure, however (Henrich et al. 2001; Henrich et al. 2004). Two problems arise in these analyses. First, because many of the groups sampled had inadequately measured variables comparable to those of other groups, it was unclear whether education or income or wealth in different samples measured the same econometrically important variable. Second, most of the societies previously sampled contained very little within-group variation in most economic variables. Thus, effects, when absent, may be driven by lack of sufficient variation or, when present, by only a few outliers.

In this chapter, I present the results of ultimatum, dictator, and third-party punishment games in a semi-urban African society in southwest Tanzania. Instead of interpreting the significance of the game behavior itself, I focus on the variables that may be able to explain variation within the sample. This society is potentially a good place to look for important individual-level variables because there is impressive variation within a single community in income, wealth, and market integration, and so it is possible to detect strong effects of these variables. I also perform bootstrapped regressions to address the potential problem of measuring highly significant but spurious effects due to outliers and the non-normal nature of essentially every variable measured, both dependent and independent. I find that individual-level variables do a poor job of explaining game behavior, whether in terms of the individual effects of variables or in overall fit. Effects that are powerful in ordinary regression almost always evaporate after bootstrapping.

THE ETHNOGRAPHIC SETTING

The village of Isanga is a sprawling community in the southern highland region of Tanzania. It is a mile from the regional capital of Mbeya, a center of trade and commerce for the southwestern portion of the country. The total

population of Isanga is estimated by the government administration at approximately eight thousand individuals, including children, who comprise a little more than half the total.

The physical environment in Isanga is steep and very seasonal. At a little over four thousand feet of elevation, the temperature can reach freezing on early summer nights, but become warm—in the low eighties (Fahrenheit)—during the day, since solar radiation is intense at eight degrees south of the equator. The region receives good rainfall most years, but still experiences occasional dry years.

Ethnic Diversity

Most of the residents of Isanga are ethnically Nyakyusa, a Bantu group originating in a territory just south of Mbeya (Wilson 1951). The Nyakyusa are traditionally high-altitude banana cultivators who keep small numbers of stabled cattle. Since the colonial period, they have been thoroughly Christianized and eager to pursue educational opportunity. Many Nyakyusa are now successful businesspeople, although many are subsistence farmers. The Nyakyusa are well known among cultural anthropologists for their (now-historical) practice of age-villages, in which a generation of men from each village would leave their natal homes and found together a new village, to which they would bring wives when they eventually married. Young men would often return home to sleep when such villages were first formed but would later stay in the new age-village. Elders suggested to anthropologists Godfrey and Monica Wilson (Wilson 1951) that this pattern of settlement was important for building strong ties among men as they matured, leading to a strong village community. Age-villages were possible only under conditions of land availability, however, and the practice has not occurred since the 1890s.

There are individuals of many other ethnic groups living and working in Isanga. Most are other groups originating in the southern highlands (Safwa being the group whose ethnic homeland is the region surrounding Isanga; see Shorter 1972), but there are also substantial numbers of Hehe, originating in the central highlands of Tanzania, as well as small numbers of individuals originating from all over the country. This makes the ethnic picture of Isanga one of a core population of Nyakyusa, who comprised almost 50 percent of my household census, mixed in with members of many

other ethnic groups. As is typical in Tanzanian communities, ethnic relations are friendly. Most individuals exhibit a preference for interaction and marriage within their own ethnic group, but friendships and marriages that cross ethnic categories are common. Some groups, however, such as the Nyasa from the southern border with Malawi, are almost exclusively endogamous. Nyasa individuals will often travel to Malawi to find a spouse and then return to live in Tanzania.

The Safwa, who mostly reside in Upper Isanga at higher elevations, are an interesting case because they are the nominal founders of communities in this area. As the Nyakyusa have increased in number, residents say that the Safwa have retreated up the mountain and now have less influence in the community. Members of other ethnic groups commonly told me that the Safwa were contemptuous of the Nyakyusa and increasingly spiteful toward other immigrant ethnic groups.

Economic Diversity

Isanga is an economically diverse community. Most residents farm, in at least a quarter-acre garden, and many also participate in household production of items (including clothing, charcoal, firewood, woven mats, and furniture) for sale in village or regional markets. Others rely on wage labor, as schoolteachers, nurses, doctors, and government employees. Some residents run shops or rely exclusively on the buying and selling of goods. A small fraction provide services such as hairstyling and braiding, both of which are quite profitable. Many individuals also keep domestic animals, including chicken, geese, goats, cattle (both European dairy cattle and Asian/African zebu), pigs, and turkeys. Trade specialization is the norm, and no household is close to being self-sufficient.

Cooperation

Cooperation within Isanga is principally structured by patrilineal kinship. Most economic activities are carried out by members of nuclear families, and cooperation beyond these units extends first to close patrilineal relatives in other households. This means that sisters who share a father may help one another in planting, harvesting, and market activities.

Although the bulk of day-to-day cooperative activity is kinship-structured in these ways, there are occasional conspicuous demonstrations of wider sharing and cooperation. Neighbors extending as far as a dozen households outward are able to request small gifts of flour, salt, sugar, or labor at any time. These requests, according to my own observations and many statements by community residents, are never refused. “Only a hyena,” according to one informant, “would turn away a neighbor.”

Larger-scale nondyadic cooperation occurs through church events. Congregations, of which there are several, collectively build and renovate churches and mosques. Collections are taken as well, to fund clerks and leaders of these congregations. Beyond religious congregations, schools, roads, and clinics are usually built by volunteer community labor. The government or an outside company purchases raw materials for the construction, and households provide the labor. Participation in these volunteer projects is apparently widespread—a majority of households I questioned directly about the most recent school foundation construction reported sending at least one person to participate.

DATA COLLECTION

The core of the data collection methodology is described in the summary chapter (chapter 18, available at: http://www.russellsage.org/Ensminger). Here I present details relevant only to my field site.

A challenge in conducting economic games in natural communities lies in minimizing contamination as participants leaving the game spread information about it to other members of the community who might play on later days. In a large village like Isanga, it is possible to play in different regions of the village on different days, reducing the likelihood of such contamination. I played the dictator game (DG) and the strategy method ultimatum game (UG) in three subvillages of Isanga: Isanga proper, a portion of the village lying east across a small stream, and a portion lying north and higher in elevation. In each of these regions, I played one day of games. Participants in each area were almost always ignorant of the game, evidenced by both their statements and their lack of knowledge when tested.

I recruited participants for the games by generating a list of residents and randomly selecting twenty in a given subvillage. These twenty were then found in person a day ahead of the actual game play and asked to attend the

games the next day in a specified location within the village. A local resident administrator made these requests, which led to very high attendance. When people failed to show up, the administrator recruited replacements immediately by finding available adults. This happened in the case of the last six participants in the third-party punishment game (TPG).

Figure 15.1 summarizes the final composition of the participants, by ethnic identification and counts in each game. The tree diagram in this figure represents the local conception of the similarities among the different ethnic groups (makabila). I derived this tree by a card sort task with a sample of four residents of four different ethnic groups (Nyakyusa, Sangu, Hehe, and Nyamwezi). Each individual was given a separate stack of note cards representing the ethnic groups within the sample. Each was instructed to sort the cards into piles of similar ethnic groups, by whatever criteria they thought appropriate. I asked each participant to first sort the cards into the smallest number of groups they could. Then, within each group, I asked them to subdivide, when possible, and told them that card stacks could not be subdivided any further. This resulted in very similar taxonomies among the four, but with some variation. I then resolved this variation into the tree in figure 15.1 by having the four discuss their different taxonomies and arrive at a consensus. They were able to do so very quickly. This resulted in four recognizable families of tribes, as well as two ethnic groups that none of the individuals felt were very similar to any of the others. This tree structure is certainly not a phylogeny, either genetic or cultural. However, it does capture the locally perceived degrees of the economic and cultural similarities of the different ethnic groups.

I provided cakes and soda to waiting participants, who were separated into two groups in two rooms, those waiting to play and those who had already played. An assistant stayed with each group, ensuring that they did not communicate with one another.

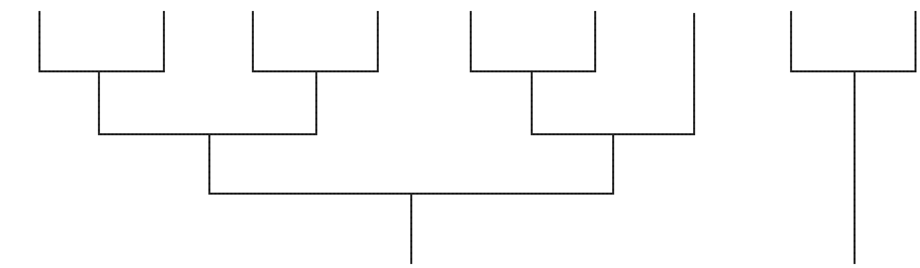
I used 100-shilling coins to illustrate all game examples, as well as to elicit offers and rejection/punishment schedules. The total stake size was 1,000 Tanzanian shillings, a little less than U.S.$1.00 at the time of the games, represented as ten 100-shilling coins. I explained each game using a prepared sheet of paper with regions representing the different players. I then transferred coins from the stack to illustrate game play and its consequences.

RESULTS

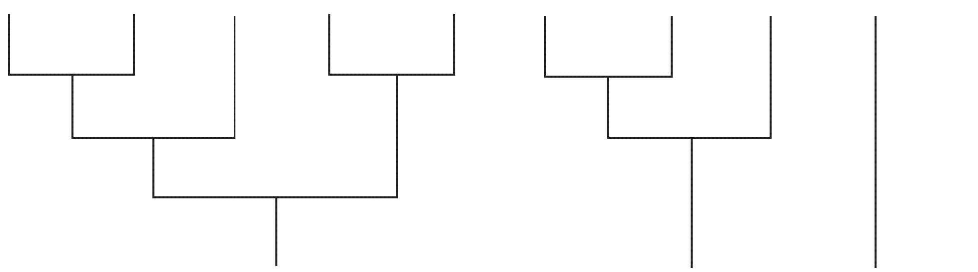
In this section, I present the results of the experiments and multivariate analyses of individual player behavior. First I provide an overall description of offers and responses in each game. Then I present a series of regressions of these data against individual-level explanatory variables.

FIGURE 15.1 *Game Participants in Isanga, Divided by Ethnic Affiliation*

	Bena	Hehe	Kinga	Wanji	Dali	Nyiha	Safwa	Bungu	Nyamwezi
N	3	9	1	2	1	1	11	4	1
DG	2/0	3/4	0/1	1/0	0/0	1/0	1/6	2/1	0/1
UG	2/0	3/4	0/1	1/0	0/0	1/0	1/6	2/1	0/1
TPG	0/0/1	2/2/0	0/0/0	0/0/1	0/0/1	0/0/0	2/2/2	0/1/1	0/1/0



	Kisi	Nyasa	Nyakyusa	Manda	Ngoni	Makonde	Ndengeleko	Ziguwa	Nyema	Pogoro
N	2	1	47	1	6	3	1	4	1	1
DG	0/0	0/0	13/10	0/1	3/2	2/1	0/1	1/1	0/1	1/0
UG	0/0	0/0	13/10	0/1	3/2	2/1	0/1	1/1	0/1	1/0
TPG	1/0/1	1/0/0	12/9/12	0/0/0	1/2/0	0/0/0	0/1/0	1/0/1	0/1/0	0/0/0



Source: Author's compilation based on author data.

Note: The tree diagram shows the local conceptualization of ethnic group similarities. The counts above each branch tip are, in order, the count of participants from each ethnic group and the counts in the dictator game, strategy method ultimatum game, and third-party punishment game. Slashes separate counts of different player types. For example, for the TPG, *x/y/z* indicates *x* player 1s, *y* player 2s, and *z* player 3s. Since individuals played multiple games, counts for the games do not sum to the count of participants for each ethnic group.

Overall Results

Figure 15.2 shows the distributions of offers (as a percentage of total stakes) in the dictator game, ultimatum game, and third-party punishment game. DG and UG offer distributions are very similar. The mean offer in the DG is 35.67 percent, and the mean UG offer is 38.33 percent. The UG mean is slightly higher, as is commonly observed in other experimental populations. The mean offer in the TPG is the lowest, at 32.50 percent.

The error bars in Figure 15.2 plot the 95 percent nonparametric bootstrap confidence intervals for each offer amount, in each game. These intervals are derived by resampling with replacement from the offer distribution in each game, ten thousand times. This generates ten thousand offer distributions. The interval for each offer amount is then the range of frequencies for that offer that were not in the 2.5 percent tails of the distribution of resampled offer distributions. In all cases, these nonparametric intervals are almost exactly the same as conventional parametric intervals computed from the *F*-distribution ($\mu \pm 1.96 * \sigma$). The nonparametric intervals, however, never fall below zero or above one, since the values to be estimated are proportions.

Although there is substantial overlap between the games, note that the observed means in each case are still the best estimates of the population offer distributions. The point of these confidence intervals is to quantify the precision of the estimates, given the precise nature of the sample. They are not intended to provide significance tests, since null-hypotheses that the games have the same offer distributions or that different offers are equally likely within each game are not reasonable, given the existing experimental literature.

Figure 15.3 plots the distributions of responses and punishment schedules for the UG and the TPG. Error bars again show 95 percent nonparametric bootstrap confidence intervals. The rejection profiles in the UG show high probabilities of rejection for the lowest offers, but the probabilities quickly approach zero. One individual insisted that offers above 50 percent of the stake should also be rejected, resulting in the small probabilities of rejection above 50 percent.

The punishment profile for the TPG shows much higher probabilities, across all offer amounts less than 50 percent. The best estimate of the probability of being punished when offering 40 percent of the stake is 0.25. The probabilities within the 95 percent confidence interval for all offers below this are all above 0.25, and in each case the best estimate is at least 0.50.

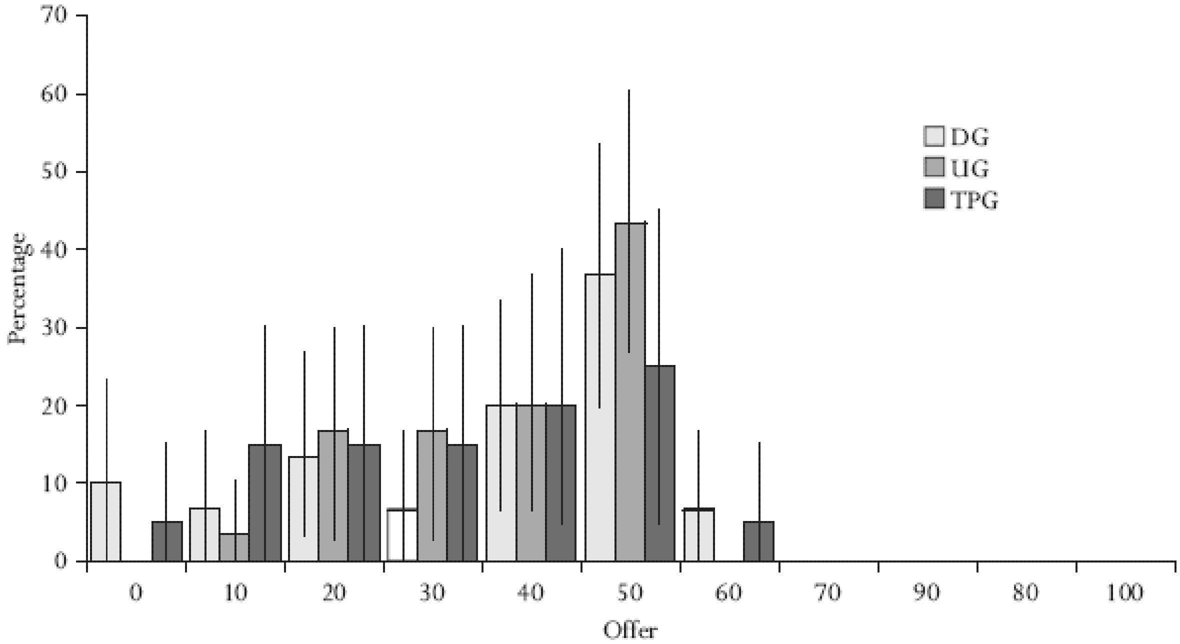
The expected income derived from offers is shown by the trend lines in figure 15.3. The income-maximizing offers (IMOs) in the UG and TPG are 10 percent and 50 percent, respectively. Comparing these values to the modes of each offer distribution, the most common offer in the TPG is the same as the IMO. The expected payoff is very flat, however, from an offer of zero percent to an offer of 50 percent. The UG mode is substantially higher.

REGRESSION ANALYSES

I performed a series of regressions to estimate the importance of a series of individual-level variables on both offer and response (rejection and punishment) behavior. For the offers, I used percentage offered to player 2 in the DG, UG, and TPG as a dependent variable. For responses, I used the smallest offer that player 2 accepted—the minimum acceptable offer (MinAO)—in the UG and the smallest offer that 3 player did not fine—the minimum unfined offer (MUO)—in the TPG.

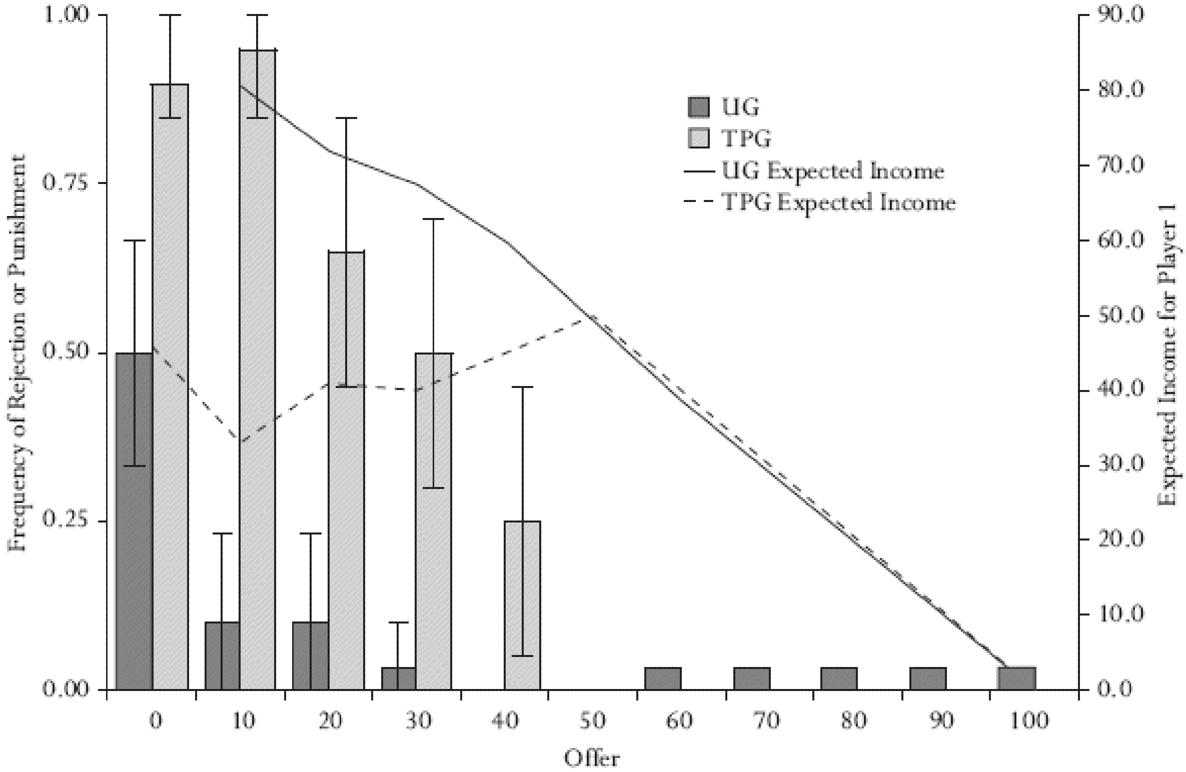
These regressions model both the percentage offered and the MinAO and MUO as continuous measures with normally distributed error. This is certainly not correct: percentage offer is a discrete distribution in these games (eleven levels), and the observed pattern of offers in each game demonstrates that error is not symmetrical. Also, many of the independent variables that I present are highly non-normal (figures 15.4 and 15.5). Transformations cannot help, because the mode in several important cases is at the minimum or maximum value (for example, wealth in figure 15.4). Still, while the precise parameter estimates and *p*-values are suspect, the direction and rough magnitude of effects may still be useful. To estimate how robust any measured effect is, I bootstrapped (using the boot library in R; see R Development Core Team 2011) each regression ten thousand times to generate nonparametric confidence intervals for each parameter in each model. An effect that remains strong in the bootstrap generalization is robust to variations in the exact data used in the regression. In the results tables for each regression, I indicate the bootstrap *p*-values by daggers trailing the standard error of each original estimate.

FIGURE 15.2 *Isanga Offer Amounts in the Dictator, Ultimatum, and Third-Party Punishment Games*



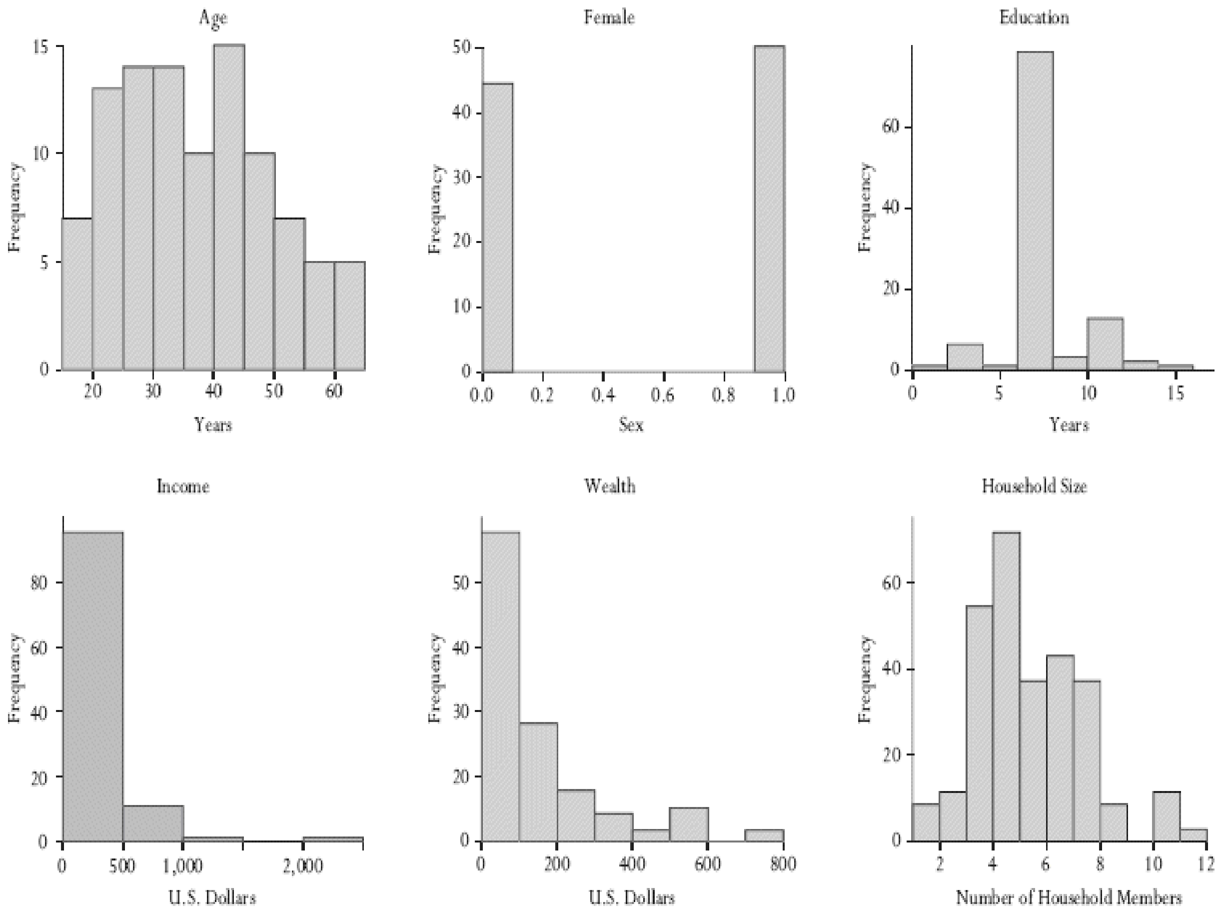
Source: Author's compilation based on author data.
Note: Error bars indicate 95 percent nonparametric bootstrap confidence intervals.

FIGURE 15.3 *Frequency of Rejection (UG) and Punishment (TPG) in Isanga Sample and Expected Income for Player 1s*



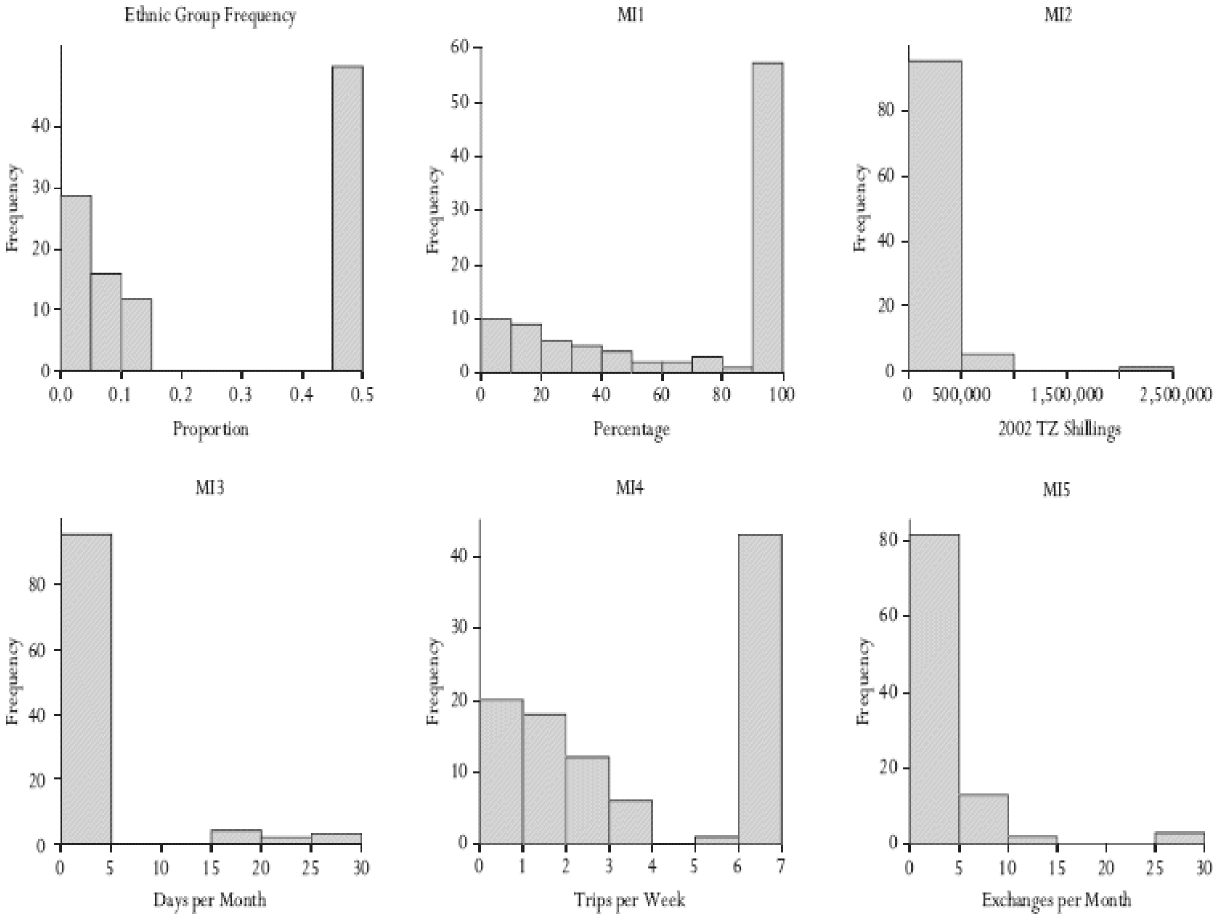
Source: Author's compilation based on author data.
Note: Error bars indicate 95 percent nonparametric bootstrap confidence intervals.

FIGURE 15.4 *Distributions of Five Basic Independent Variables Used in the Regressions*



Source: Author's compilation based on author data.

FIGURE 15.5 *Distributions of Independent Variables, Ethnic Group Frequency, and the Five Market Integration Variables*



Source: Author's compilation based on author data.
Notes: All coefficients are standardized.

TABLE 15.1 *Regressions of Six Standard Variables Against Dictator Game, Ultimatum Game, and Third-Party Punishment Game Offers, UG Minimum Acceptable Offers, and TPG Minimum Unpunished Offers*

Variable	DG Offer Standard β (Standard Error)	UG Offer Standard β (Standard Error)	TPG Offer Standard β (Standard Error)	UG MinAO Standard β (Standard Error)	TPG MUO Standard β (Standard Error)
Age	0.1081	0.3587*	0.1610	−0.0306	0.1967
	(0.2109)	(0.1986)†	(0.2569)	(0.2469)	(0.2096)
Female	0.3577	0.3049	−0.2316	−0.0376	−0.0485
	(0.2163)	(0.2038)	(0.2793)	(0.2164)	(0.1748)
Education	0.1080	0.2954	−0.3270	0.0946	−0.6271**
	(0.2136)	(0.2012)	(0.3001)	(0.2146)	(0.2289)
Income (U.S. dollars)	0.1867	0.0582	0.1292	−0.0407	0.3568*
	(0.2147)	(0.2022)	(0.2591)	(0.2059)	(0.1666)
Wealth (U.S. dollars)	0.0730	−0.0861	−0.1690	−0.0742	−0.4953**
	(0.2562)	(0.2414)	(0.3305)	(0.2187)	(0.2041)
Household Size	−0.0523	0.2465	−0.1492	−0.3217	−0.2417
	(0.2044)	(0.1925)	(0.2666)	(0.2051)	(0.2366)
Observations	30	30	20	30	20
Adjusted R-squared	−0.0653	0.0547	−0.0404	−0.0711	0.5661

Source: Author's compilation based on author data.
Notes: All coefficients are standardized.
* $p < 0.10$; ** $p < 0.05$; † after the standard error, indicates that an estimate was significant in a bootstrap test of robustness

I begin by presenting a basic model in which the dependent variables are functions of age (years), sex (male = 0, female = 1), education (years of schooling), individual annual income (in U.S. dollars), household wealth (in U.S. dollars), and household size (number of adults and children) (see table 15.1). This model is the foundation of the regressions to come.

The majority of model effects are small and imprecise. Only age in the UG remains significant (large and precisely estimated) after bootstrapping. This effect is actually quite modest in explaining variation: the adjusted R-squared for the UG model is only 5 percent. The moderate positive effect of income on the TPG MUO vanishes after bootstrapping, and the stronger negative effects of education and household wealth also both vanish in the bootstrap.

Ethnicity Effects

In an attempt to estimate the role of ethnic variation (see figure 15.1), I added to the basic models in table 15.1 a set of model effects coding the ethnicity of the participants (table 15.2). There are too many different individual ethnic groups to hope to estimate reliable parameters for each. Instead, I grouped ethnic labels by the major groups in figure 15.1. There are four major groups: the southern highlands (SH) groups (Nyakyusa, and so on), the neighboring central highlands (CH) groups (Hehe, Safwa, and so on), a Nymawezi (NY) culture group, and a Makonde (MA) culture group. The remaining ethnic groups (Pogoro and Nyema) were omitted from this coding scheme. I also included ethnic identity, not as a categorical variable, but as the frequency of individuals of each ethnicity present in the total sample. These frequencies are estimates of the overall community frequencies of each ethnic group. One might predict that more common ethnic groups, placed in an apparently anonymous game with a random member of their community, would offer more, owing to the favoritism of coethnics and an increased chance of interacting with a coethnic when one is a member of a common ethnic group. The widespread ethnographic observation of in-group biases in cooperation (Levine and Campbell 1972) and the theoretical plausibility of the stability of such behavior (McElreath, Boyd, and Richerson 2003) suggest that it is worthwhile to look for ethnic group effects of these kinds.

TABLE 15.2 *Regressions of Six Standard and Five Ethnicity Variables Against Dictator Game, Ultimatum Game, and Third-Party Punishment Game Offers, UG Minimum Acceptable Offers, and TPG Minimum Unpunished Offers*

Variable	DG Offer Standard β (Standard Error)	UG Offer Standard β (Standard Error)	TPG Offer Standard β (Standard Error)	UG MinAO Standard β (Standard Error)	TPG MUO Standard β (Standard Error)
Age	0.1700	0.3439	0.2266	−0.0093	−0.0624
	(0.2441)	(0.2059)	(0.3007)	(0.2647)	(0.2494)
Female	0.1199	0.4697*	−0.2993	−0.1382	−0.2887
	(0.2676)	(0.2257)†	(0.3352)	(0.2401)	(0.2095)
Education	0.0559	0.5071**	−0.1603	−0.0894	−0.5094*
	(0.2392)	(0.2018)†	(0.4086)	(0.2367)	(0.2411)
Income (U.S. dollars)	0.1154	0.0032	0.0518	−0.1139	0.3075*
	(0.2248)	(0.1896)	(0.4880)	(0.2099)	(0.1644)
Wealth (U.S. dollars)	0.0472	−0.2196	−0.2485	−0.2654	−0.7019**
	(0.2753)	(0.2322)	(0.4592)	(0.2490)	(0.2505)†
Household Size	−0.3298	0.5368**	−0.0837	−0.5983**	−0.0371
	(0.2801)	(0.2362)†	(0.3251)	0.2439†	(0.2672)
Ethnic group frequency	−0.7142	0.8401**	−0.1428	−0.3671	0.2262
	(0.4380)	(0.3694)	(0.6555)	(0.3381)	(0.3632)
Ethnic branch: CH	0.6438	0.2924	−0.2189	1.4420**	−0.0436
	(0.5778)	(0.4873)	(0.5177)	(0.6608)	(0.3023)
Ethnic branch: MA	0.4626	0.5546	0.2062	0.8446*	−0.1867
	(0.3956)	(0.3336)	(0.4176)	(0.4342)	(0.1969)
Ethnic branch: NY	0.6539	0.2032		0.5080	0.2836
	(0.4229)	(0.3567)		(0.3607)	(0.2232)
Ethnic branch: SH	1.3350	−0.4637		1.6040**	
	(0.8302)	(0.7002)		(0.7571)	
Observations	30	30	20	30	20
Adjusted R-squared	−0.07533	0.2351	−0.1988	−0.06169	0.6062

Source: Author's compilation based on author data.
Notes: All coefficients are standardized.
* $p < 0.10$; ** $p < 0.05$; † after the standard error, indicates that an estimate was significant in a bootstrap test of robustness

TABLE 15.3 *Pairwise Correlations Between Five Measures of Market Integration*

	MI1	MI2	MI3	MI4	MI5
MI1	—	0.0974	−0.0020	0.1891	0.2481
MI2	0.0974	—	0.3233	0.1542	0.4658
MI3	−0.0020	0.3233	—	−0.0985	−0.0790
MI4	0.1891	0.1542	−0.0985	—	0.3040
MI5	0.2481	0.4658	−0.0790	0.3040	—

Source: Author's calculations based on author data.
Note: MI1: percentage of diet (calories) purchased; MI2: Income from wage labor, rental, or trade (Tanzanian shillings); MI3: frequency (days) of wage labor in previous month; MI4: trips to any market in the last week; MI5: frequency of purchasing goods expressly for resale in the last month.

When we control for ethnic identity, several of the control variables become more predictive. For UG offers, female, education, and household size are now sizable positive effects that survive the bootstrap. Ethnic frequency is also a very powerful effect for UG offers, but this effect depends on a small number of individuals from rare ethnic groups, and so the effect flattens in the bootstrap regressions. Effects elsewhere in the table are not robust in bootstrap, except for household size (negative effect on UG MinAO) and household wealth (negative effect on TPG MUO).

Market Integration Effects

Since market integration (MI) turned out to be explanatory across societies in the first round of games, we developed five measures of individual market integration that we might use to explain variation in offers within societies. Table 15.3 shows the pairwise correlations among these measures, as well as their definitions. In some cases, the pairwise correlations are moderate, but never above 0.50. Individuals who often buy and sell for profit (high MI5) also rely on the market for their food (higher MI1), have more income from wages, and so on (higher MI2), and make more trips to the market (higher MI4). Predictably, individuals who do more wage labor (high MI3) have more income from such sources (higher MI2).

To investigate the effect of these variables on offers in the three games, I regressed the five MI variables against offers and responses (table 15.4). Overall, market integration variables do a poor job of explaining variation in offers and responses, whether alone or controlling for demographic and wealth effects. While MI4 and MI have strong estimated effects for TPG offers, these effects are not at all robust, vanishing in the bootstrap.

Results Summary

No variable explains a large portion of the variance in offers. Several have consistent but weak effects across the games, and there is weak evidence that families of ethnic groups differ slightly in their offers. Individual wealth and income are inconsistently related to offers and even have different estimated directions of effect in the same game. Market integration variables are inconsistent in direction and in their effects, and none are powerful explainers of variation in the bootstrap.

DISCUSSION AND CONCLUSIONS

Despite a considerable effort to collect plausible explanatory variables, few consistent and powerful effects explaining variation in either offers or responses (rejection and fining schedules) were found in these data. Income and wealth have inconsistent effects in their direction across games, and in only one case (TPG MUO) did wealth have a strong effect in all of the regressions. Similarly, market integration measures, across games, either do a poor job of explaining variation or are inconsistently related to offers.

TABLE 15.4 *Regressions Using Market Integration Variables Against Dictator Game, Ultimatum Game, and Third-Party Punishment Game Offers, UG Minimum Acceptable Offers, and TPG Minimum Unpunished Offers*

Variable	DG Offer Standard β (Standard Error)	UG Offer Standard β (Standard Error)	TPG Offer Standard β (Standard Error)	UG MinAO Standard β (Standard Error)	TPG MUO Standard β (Standard Error)
Age	0.1872	0.2841	−0.0041	−0.1848	0.4812
	(0.2527)	(0.2266)	(0.3240)	(0.2623)	(0.2839)
Female	0.2828	0.4006	−0.4267	−0.1098	0.6301
	(0.2956)	(0.2651)	(0.2389)	(0.2123)	(0.3740)
Education	0.1504	0.5089	−0.5173	−0.0479	−0.7932**
	(0.4437)	(0.3980)	(0.2856)	(0.2114)	(0.3045)
Income (U.S. dollars)	0.0646	0.2103	1.6640	−0.3856	0.5232**
	(0.2745)	(0.2462)	(1.6730)	(0.4075)	(0.2043)
Wealth (U.S. dollars)	−0.0708	−0.2700	−0.4908	0.2964	−0.2607
	(0.3707)	(0.3325)	(0.3812)	(0.2897)	(0.2619)
Household Size	−0.1721	0.4917	−0.2014	−0.1611	−0.5805
	(0.3677)	(0.3297)	(0.2615)	(0.2047)	(0.3943)
MI1	−0.3886	0.1871	−0.5161	0.4547	0.0508
	(0.2936)	(0.2633)	(0.3471)	(0.2842)	(0.2258)
MI2	0.1367	0.0513	−1.7180	1.0730*	0.0590
	(0.3090)	(0.2771)	(1.7700)	(0.5718)	(0.3093)
MI3	−0.0725	−0.3030	0.0516	−0.4915	−0.2967
	(0.5002)	(0.4486)	(0.3020)	(0.4769)	(0.2619)
MI4	0.1812	−0.1752	−0.6239**	−0.0678	−0.5110
	(0.3177)	(0.2849)	(0.2403)	(0.2824)	(0.3260)
MI5	0.0139	−0.3555	0.8936**	−0.5423*	−0.5774
	(0.2496)	(0.2239)	(0.3060)	(0.2918)	(0.3117)
Observations	30	30	20	30	20
Adjusted R-squared	−0.1958	0.03823	0.3414	0.1002	0.5627

Source: Author's calculations based on author data.
Notes: All coefficients are standardized.
* $p < 0.10$; ** $p < 0.05$

In light of these results, it seems unlikely that the standard explanatory variables (age, sex, income, and so on) and market integration measures can explain much of the variation in Isanga game behavior. Given the likely imprecision in measuring market integration, it is of course possible that measurement error in the independent variables is masking their effects. It is also possible that MI measures could have different effects in different games, but support for this finding demands that the direction and magnitude of the effects be replicated in other data sets. A basic problem in these data is that there are many interesting and intuitively plausible explanatory variables to include in the models. With thirty observations per game, the number of interesting explanatory variables can in fact approach the number of observations. Many of the interesting explanatory variables are also intercorrelated, sometimes substantially. These two facts together make it dangerous to simply try out every plausible effect and report significant or sizable effects. By chance alone, a number of these variables will correlate strongly with offer or response schedules, without any reliable casual relationship.

Thus, it is important to compare the direction and magnitude of model effect estimates across study sites if the explanatory robustness of these estimates is to be validated. It is always tempting, especially for a field anthropologist, to devise a clever and appealing explanation of any significant result found in a regression. Given the usual small number of observations and potentially vast number of explanatory variables, significant effects are guaranteed. Finding that the effects exist in other places talks to the explanatory power of those variables, while post hoc explanations of their causal effects in a specific population have comparatively little value to general understandings of behavior. This is not to say that unique effects do not exist. They most certainly do, and understanding the cross-population interactions among variables is a necessary component of the larger understanding of cooperative behavior that the Roots of Human Sociality Project is developing. It is important, however, to beware of developing special explanations of the results in each population as an alternative to building general frameworks to explain experimental game behavior cross-culturally.

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Chapter 16

Social Preferences Among the People of Sanquianga in Colombia

Juan-Camilo Cardenas

The Afro-Colombian groups that have for many centuries occupied the Pacific Coast of Colombia have always been involved in one way or another with the social dilemma of extracting natural resources through mining and making use of the region's forests, mangroves, and fisheries. Over the centuries, urban and rural settlements in this coastal region have been separated from the experience of state intervention and Western development more typical of the Andean regions of Latin America. The differences in basic social indicators within the country reflect the lack of formal institutions and actions to address social needs through the provision of public goods such as health, education, and employment, among others.[1] Further, the majority of ecological settings are mangrove and catival forests, which provide adverse conditions for the emergence of individual property rights over productive assets such as land and livestock.

Under joint access and in the absence of the state, these groups are more highly dependent on natural resources. Thus, there are grounds for the hypothesis that these groups would maintain a set of social preferences for endogenously solving the kind of coordination failures that emerge in many small-scale groups through more informal mechanisms or institutional arrangements at the community level. Preferences that are more prosocial can be valuable in solving the coordination, bargaining, and cooperation problems typical of groups facing, for instance, the joint use of a common-pool resource or the voluntary provision of other basic needs (for instance, social insurance using informal safety nets through generosity and reciprocal gifts).

Using the same set of experimental methods described in chapter 3 to measure mechanisms and traits such as altruism, reciprocity, and endogenous punishment of antisocial behavior, we explored the presence of

social preferences in a community of Afro-Colombians occupying the mangrove forest of the Colombian Pacific Coast and the mechanisms involved in their maintenance. We compare the validity of these experiments to examples from outside of this field-site context. In this respect, our exploration of whether poverty and wealth based on private assets are associated with more or fewer social preferences within these groups is of particular interest. Previous experimental work in other rural settings of Colombia suggests that people who are more dependent on common-pool resources or households with fewer private assets such as land and livestock find it more difficult to solve a local-commons dilemma through endogenous mechanisms (Cardenas 2003; Cardenas et al. 2002).

This chapter starts with a brief description of the background of the population from which the sample was drawn. It then enumerates the basic experimental design and gives details about the sample. The chapter closes with a discussion of the results in terms of the experimental design, the institutions tested, the incentives constructed, and the socioeconomic data collected.

THE SANQUIANGA COMMUNITIES AND THEIR ENVIRONMENT

The extraction of natural resources has long marked the human occupation of the southern part of the Pacific Coast in Colombia. During the seventeenth and eighteenth centuries, gold mining led to the establishment of settlements for gold extraction and trading. Over the centuries, the economic activities of these settlements have changed to other resource extraction—like rubber, tagua, and naidi palm—and logging, while the fisheries and other mangrove forest resources have continued to be exploited for the subsistence of the communities (Restrepo 1996a; del Valle et al. 1996).

The Sanquianga people are Afro-descendent communities. They have occupied the sea-level mangrove and catival forests of the Pacific Coast and the tropical humid forest of the Nariño region (photo 16.1) since the abolishment of slavery in Colombia in the 1850s. Most of these groups spread through the forest and along the natural canals of the forest in small settlements, alternating small farming with extractive activities, initially gold mining. They then began logging for the logging mills established in the main settlements of the region. In the coastal areas today, much of the

economic activity centers on extracting resources from the mangrove forest (firewood, logging, mollusks, crabs) and from the coast (shrimp, fish) while benefiting from other goods and services from this ecosystem (for instance, protection from natural disasters such as high tides and tsunamis).

In 1977 a large portion of this region (about eighty thousand hectares) was declared the Sanquianga National Park for conservation purposes. Today about eleven thousand people live within the boundaries of the park (Ministry of Environment and Sustainable Development 2013). The two settlements where the experiments were conducted, Bazán and Amarales, are located within the park and are similar to other settlements in the five municipalities that overlap with the park area. The region is accessible by boat from the nearby urban centers (Guapi or Tumaco) and by airplane or secondary road from the south-central part of the country.

The area is located within longitude 2° 22' to 2° 04' north and 78°76' and latitude 75°37 west. Humidity is around 80 percent, annual rainfall is between 3,000 and 3,500 millimeters, and the mean temperature is 26 degrees Celsius. June and July are the months with the highest rainfall, and November is the month with the lowest; there is no deficit of water throughout the year.

The two arrows in the map in figure 16.1 show the location of the two settlements where the experiments were conducted. The darker area corresponds to the mangrove forest along the coast and crossing the border with Ecuador. The thick line is the border of the national park within which the settlements are located. The map also shows the main municipalities in the region.

Table 16.1 provides demographic data for the urban and rural populations in the region. Most of the participants in the experiments lived in the municipalities of El Charco and La Tola. The demographic projections for the five main municipalities show that, on average, two-thirds of the population lives in the rural areas.

Their dependence on extractive resources has always been a major challenge for these communities. Likewise, the challenges of resource extraction put a greater pressure on solving the social dilemma of a common-pool resource. Extraction of the piangua clam (*Anadara tuberculosa*) is mostly the work of women, who use the clams for home consumption as well as for sale in local markets. In the last few years, however, many changes have resulted from the decrease in the piangua clam

supply in neighboring Ecuador and the decrease in shrimp and fish stocks in the coastal fisheries of the region. Extraction has increased, market size has decreased, and the population devoted to its extraction has changed to include men. State regulation of natural resource use by the officers of the Sanquianga National Park is weak: they provide minimal monitoring and have few enforcement resources, and few rules have been issued by the national and regional environmental authorities. Recently, however, attempts have been made to formalize agreements with local communities and organized groups to limit haul sizes, as well as net types and sizes, and to enforce a closed season for some resources, according to biological cycles.

PHOTO 16.1 *Mangrove Forest in the Pacific South, Nariño*

Source: Author's photograph.

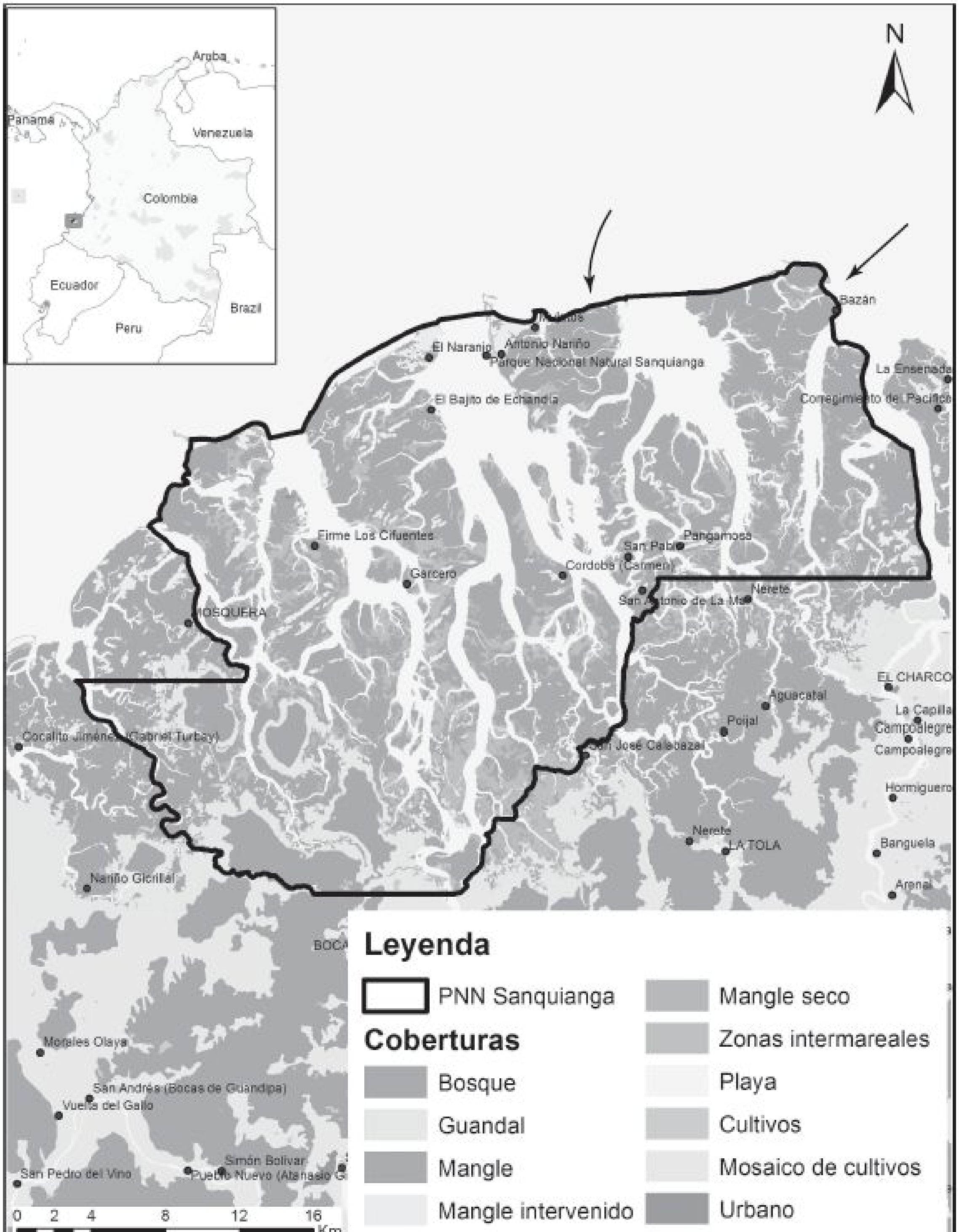
Demographic Data on Experimental Game Participants

The demographic and socioeconomic data on the participants in our experiments in Sanquianga provide a fair representation of the context in which these communities operate with respect to the ecosystem and the

markets. Participants lived in two settlements, Amarales and Bazán, which are a few miles apart and have very similar ecological and economic conditions (see figure 16.1). Because the settlements are small, it was difficult to recruit the entire sample from one settlement. Thus, 62 percent of participants were recruited in Bazán and the remaining 38 percent in Amarales. Later we describe the process by which we recruited subjects. Here a summary of the demographics for the entire sample is provided in table 16.2.

The tenure demographic, obtained by dividing the number of years a participant had lived in the present settlement by his or her age, is about 53 percent (table 16.2). About one-third of the respondents had lived their entire life in this location, while the rest of the respondents were spread across the spectrum. There has been mobility across settlements and across regions for various reasons, including political violence and labor market fluctuations.

FIGURE 16.1 *Location of Sanquianga Field Site on the Pacific Coast of Colombia*



Source: World Wildlife Fund, WWF-Colombia Program, available at: www.panda.org/who_we_are/wwf_offices/colombia.

TABLE 16.1 *Urban and Rural Populations of the Main Municipalities in the Coastal Region of Nariño*

Municipality	Total	Urban	Rural	Percentage Rural
El Charco	21,464	5,827	15,637	73%
Mosquera	11,167	3,279	7,888	71
La Tola	6,659	3,613	3,046	46
Olaya Herrera	28,697	9,305	19,392	68

Source: Projections based on the 1993 census (Departamento Nacional de Estadística 2013).

TABLE 16.2 *Demographic Variables for the Sanquianga Sample*

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Gender (Female = 1)	186	0.56	0.497	0	1
Age (years)	185	36.19	15.027	16	77
Education (years)	186	4.05	3.140	0	13
Household wealth (U.S. dollars)	186	$2,234.98	$4,383.50	0	$46,862.31
Individual income (U.S. dollars)	186	$1,894.74	$2,321.70	0	$14,803.85
Household individual year income	186	6.68	2.93	2	16
Tenure (as percentage of age)	185	0.53	0.35	0.004	1

Source: Author's surveys conducted during experiments.

Market Integration

Five indices of market integration (MI) were developed for this study to describe the socioeconomic characteristics of this group and communities:

MI1: Percentage of household diet purchased in the market

MI2: Income from wage labor, rental, and trade (in Colombian pesos)

MI3: Frequency of wage labor in the last month (in days)

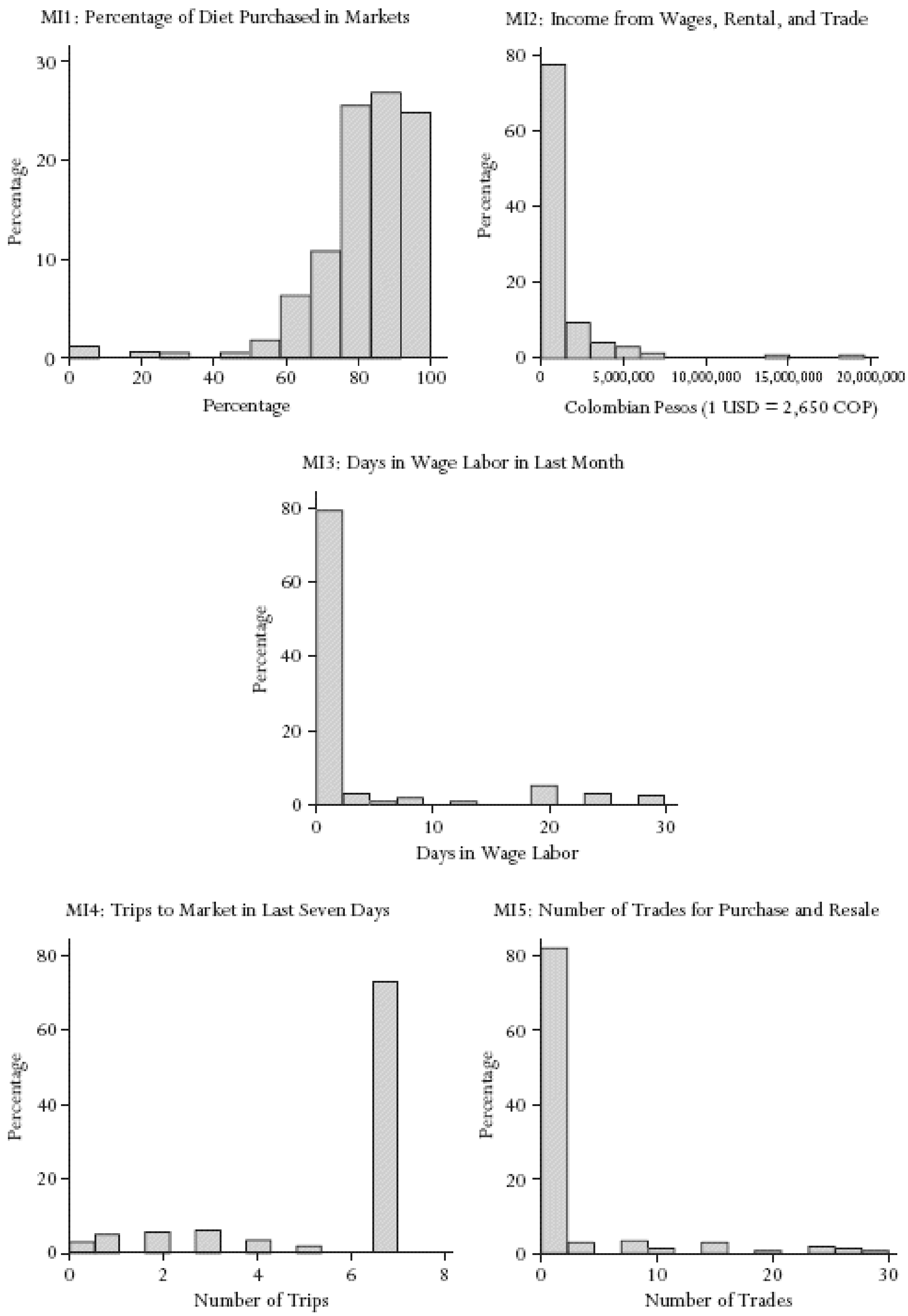
MI4: Trips to market in the last seven days

MI5: Frequency of trading goods for purchase/resale during the last month (in trades)

These measures were estimated based on the survey data gathered in the individual and household surveys conducted with the entire sample of 186 participants. Figure 16.3 compiles the MI variables for the Sanquianga sample.

As we can see in figure 16.2, a large percentage of the participants acquired more than 80 percent of their diet from the market, primarily from small local stores and trading boats that passed by regularly. These people interacted very frequently with the market on a daily and weekly basis to purchase very small amounts of staple food—usually rice, oil, salt, plantains, and canned food—to complement their catch from fishing and piangua clam gathering. Very few people owned or farmed land for subsistence but rather bartered “sea for land” weekly when farmers from the upper stream settlements on the Tapaje, Sanquianga, and Satinga rivers came down with their plantains and other crops to acquire fish and other coastal resources.

FIGURE 16.2 *Distributions in Sanquianga for the Five Market Integration Indices (N = 186)*



Source: Author's surveys conducted during experiments.

TABLE 16.3 *Correlation Coefficients for Market Integration Variables*

	MI1	MI2	MI3	MI4	MI5
MI2	0.0642	1.0000			
	0.4260				
	156	186			
MI3	−0.0698	0.3965*	1.0000		
	0.3867	0.0000			
	156	186	186		
MI4	−0.0271	−0.0932	−0.1864*	1.0000	
	0.7371	0.2058	0.0109		
	156	186	186	186	
MI5	0.0123	0.0639	0.1684*	−0.0772	1.0000
	0.8791	0.3863	0.0216	0.2952	
	156	186	186	186	186

Source: Author's calculations based on author data.
Note: p-values and sample size are under correlation coefficients.
*Significant at 10 percent

However, a very small fraction of Sanquianga income is earned through labor markets, as also seen in figure 16.2. These people very rarely engage in wage labor, which includes being hired to repair fishing nets, build houses, or work on the local government's sporadic infrastructure or maintenance projects. Therefore, correlations among these market integration indices are very weak, as shown in table 16.3. As expected, only income from market exchanges involving wages and frequency of participation in the labor market are correlated.

Wealth and Income

Material wealth as represented in productive assets with a market or exchange price was rather rare among our participants (see figure 16.3). More than 80 percent of them reported owning no assets that could be accounted as material wealth with some market exchange value, such as farmland, livestock, or other productive equipment. A few people reported owning boats, some animals, a few hectares of land, or an outboard motor.

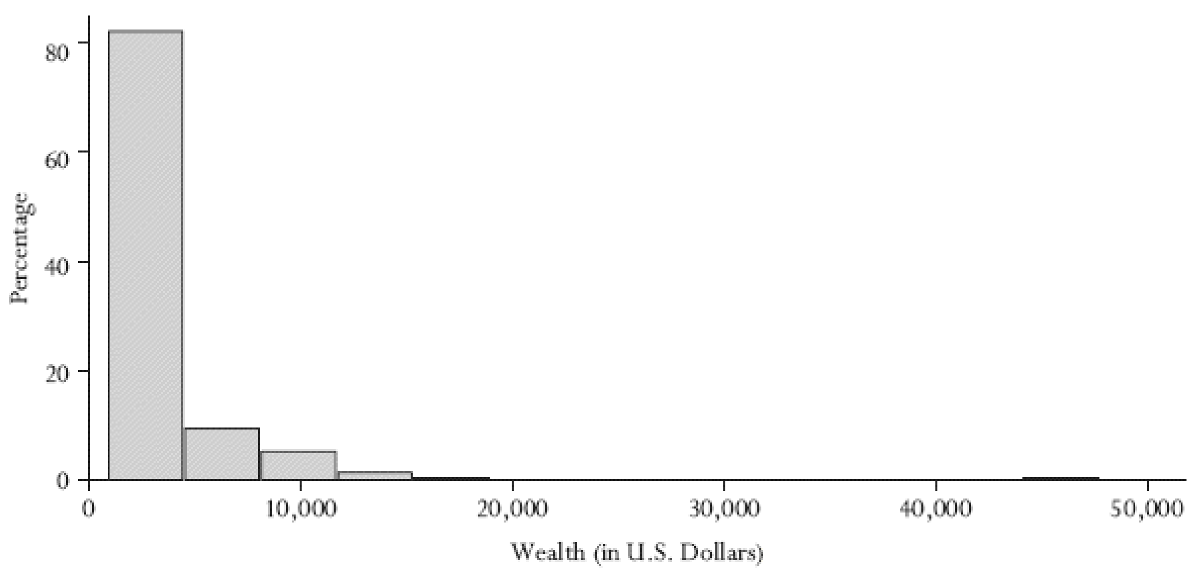
About half of the participants reported earning no income from the following activities: wage work, trading profits, selling home-produced items, rental income, and cash remittances. About 25 percent of the participants reported earnings of about $1,000 per year (in 2003 U.S. dollars), 10 percent reported earnings of between $1,000 and $2,000, and the

remaining 15 percent were spread across the rest of the range, with very few earning even up to $15,000 per year (see figure 16.4).

Further tests on the sample data show no significant correlations among education, wealth, and income variables. Gender does seem to be negatively correlated with income and wealth—namely, women earned a substantially lower income (based on our measure) and owned fewer assets, as measured by the protocol used. However, no significant difference exists in years of education by gender, which oscillates around 3.5 and 4.5 years of primary school for the sample.

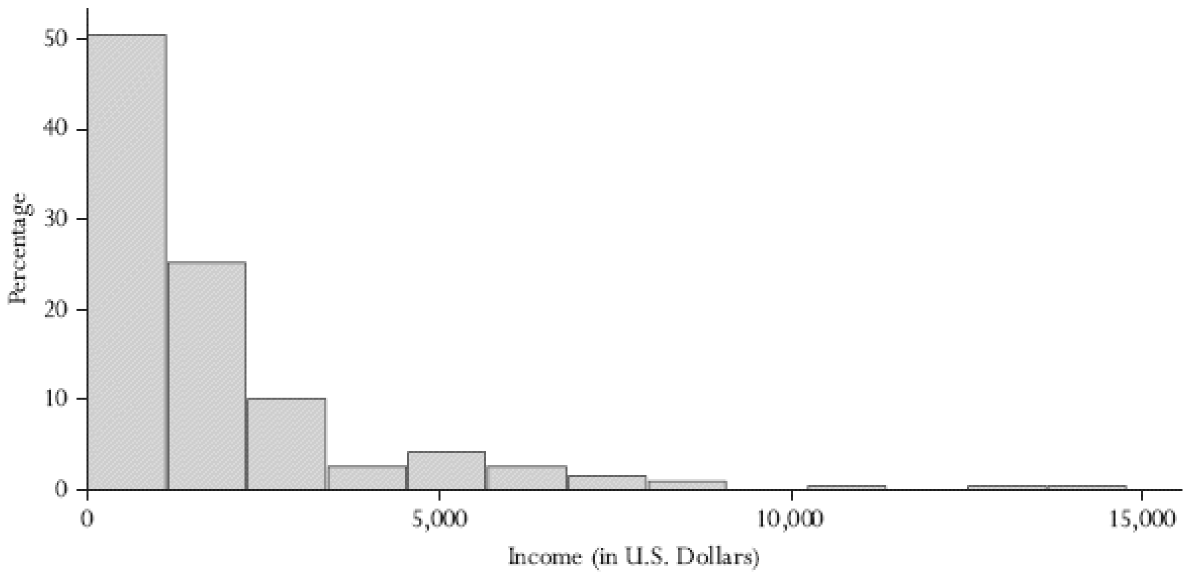
Based on these data, direct observation, and other sources (Restrepo 1996a, 1996b; del Valle 1996), we could describe the economic and social systems of the people of Sanquianga as highly dependent on extractive natural resources subject to the common-pool resource dilemma. Only a minor fraction of the households in our sample were dependent on private wealth such as land or livestock. Human capital as expressed in educational achievement does not seem to explain either individual- or household-level income or wealth.

FIGURE 16.3 *Distribution of Wealth in Productive Assets Valued at Local Prices in the Sanquianga Sample*



Source: Author's compilation based on author data.

FIGURE 16.4 *Distribution of Income from Wage Labor, Trading, Profits, and Remittances in the Sample of Sanquianga*



Source: Author's compilation based on author data.

TABLE 16.4 *Sanquianga Sample Size, by Experiment*

Experiment	Number of Sessions	Number of People
Dictator game	30 pairs (UG)	
Strategy method ultimatum game	30 pairs (DG)	60[a]
Third-party punishment game	32 trios	96
Sealed-Envelope dictator game[a]	15 pairs	30
Total	107	186

Source: Author's compilation based on author data.
[a]Recall that for the DG and UG, the same group of people played both games, although matching was anonymous and random. Choices for the first game (DG) were not known to player 2s until the second game (UG) was finished.

Market integration in terms of frequency of visits to local markets and number of market transactions was rather high among our participants, who mostly were engaged in the purchase of goods for immediate consumption. However, the fraction of income that they generated through market transactions was rather small, despite frequently selling their catch from fishing or gathering piangua clams and, on rare occasions, obtaining wages for their labor.

AN EXPERIMENTAL APPROACH TO THE SOCIAL PREFERENCES OF THE SANQUIANGA PEOPLE

As in the rest of the studies reported in this volume, we replicated the experimental design described in chapter 3.[2] Here we provide some specific details about the setting for the experiments that may be of value to the reader.

For a listing of the economic games that we conducted in Sanquianga, as well as the number of sessions and players for each game, see table 16.4.

All experiments were conducted in Spanish by the main researcher (Cardenas), who also served as the monitor and interviewer for all sessions. Students and field assistants helped to collect the additional information on the individual and household survey data forms. All sessions were run from August 19 to August 23, 2002. Other activities—fieldwork, recruitment, follow-up, the gathering of field data and secondary sources—took up almost the entire month of August.

Based on an estimated population of about 1,500 people in Amarales and about 2,300 in Bazán, the 72 people recruited in the former and the 114 people in the latter represented roughly 5 percent of the population in these settlements. The two sites are within a few miles of each other by boat and have very similar conditions in terms of access to the resources the residents extract. Both sites are within the national park boundaries, and the two communities share a common history in terms of the origins of their people, traditions, and demographic characteristics. However, Bazán has a significantly higher level of poverty, as measured in terms of income and wealth and also as confirmed by the sampled household wealth.

Logistics: Our Field Lab

In both Amarales and Bazán, we chose the local school as the main site for conducting the experiments. We recruited participants during the days before the sessions in the following manner. Through local contacts (local leaders, schoolteachers, municipal officials), the word was spread that a set of economic exercises were to be conducted in the local school on a specific number of days and at certain times and that any adult from the village could participate. We also made it clear that no two people from the same household could be in the same session, yet we sought to have better

coverage of the entire village by encouraging people from the same household to sign up for the exercises.[3] The small size and high population density of the two settlements guaranteed that once the word was spread, it was quite unlikely that the sample could have a specific bias in favor of these contacts.

PHOTO 16.2 *Researcher with a Dictator Game Participant*

Source: Author's photograph.
Note: Researcher with a dictator game participant sitting in the second story of a municipal building in Bazán where fishermen lay their nets.

All participants were recruited in batches of about twenty people and were assigned to specific periods of the day (morning or afternoon). For each of the groups, the same protocol was followed and can be roughly summarized as follows: once the number of required people arrived (twenty people for ten pairs of DG and UG games), the door of the schoolroom was closed. Then the researcher welcomed everyone and read the instructions for the games. Once examples were presented, the roles (player 1 or 2) were assigned randomly. The actual experiments were conducted in a separate

place (see photo 16.2) where, one at a time, each participant made a decision.

While each of the players made their game decisions with the researcher, the rest of the group waited in the original schoolroom or outside. The players who had already played the game were moved nearby to a third location, usually next to another schoolroom. Both groups—those waiting and those who had finished playing—were supervised by a monitor or assistant who did not allow people to engage in conversations regarding the game. The assistants used this time to fill out the individual and household surveys, as shown in photo 16.3. We provided refreshments for the people in these groups while they waited during the sessions.

PHOTO 16.3 *Sanquianga Participants Waiting for Their Turn in the Games and a Monitor Filling Out Survey Forms with a Participant*

Source: Author's photographs.

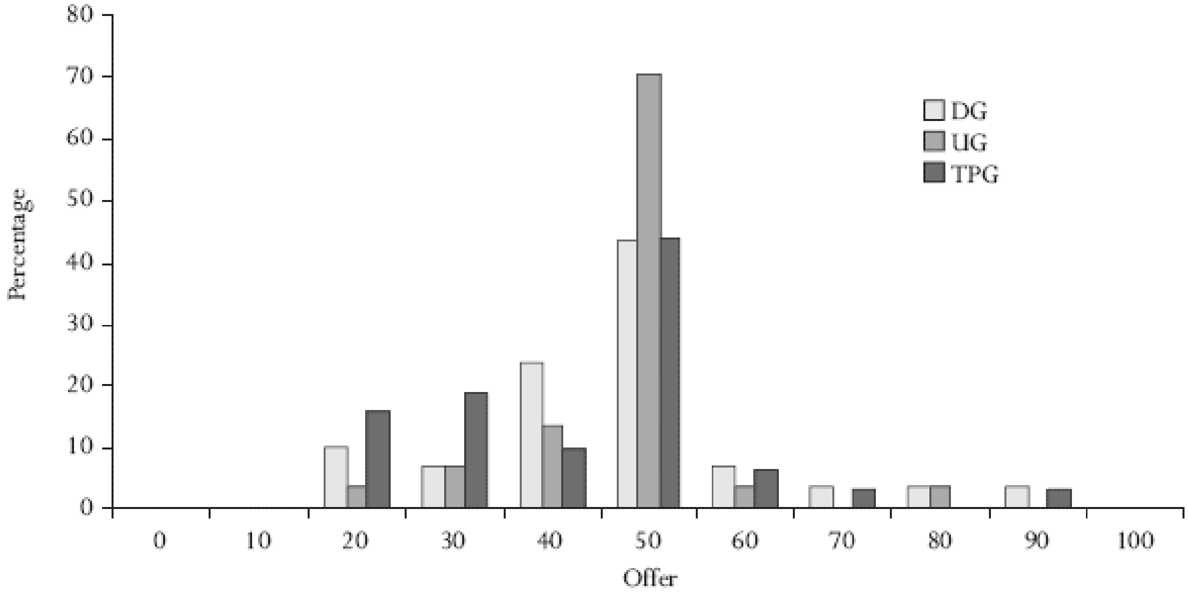
It was difficult, however, to keep the groups from discussing the decisions and strategies involved in the game, especially those in the group that had just played the games. Nevertheless, the data do not seem to support major differences between the early sessions and later sessions within a site, thus making it unlikely that there were carry-on effects.

After all the participants had played the games, they were informed about their payoffs, paid, and asked to sign receipts and finish filling out the survey forms. When these tasks were completed, we moved on to the next group of participants.

ANALYSIS: EXPLAINING BEHAVIOR IN SOCIAL PREFERENCES EXPERIMENTS

The dictator game (DG), strategy method ultimatum game (UG), and third-party punishment game (TPG) experiments provide very valuable information about people's preferences for fairness, altruism, reciprocity, and social punishment, which have emerged as key features in the literature on individuals and their economic rationality regarding others (Bowles 1998; Camerer and Fehr 2004). Given their simplicity and the standardization of the protocols, these games allow us to replicate tests across sites, cultures, social groups, and individuals, enabling us to make comparisons across sites and discover factors that may explain the observed behavior within and across sites. Such is the case with the Sanquianga people, who have very low levels of schooling and whose social relations based on fairness and reciprocity are usually observed in daily interactions with their environment and with each other.

FIGURE 16.5 *Frequency of Offers by Player 1s in the Dictator Game, the Strategy Method Ultimatum Game, and the Third-Party Punishment Game*



Source: Author's calculations based on author data.

This section describes the main outcomes of the core experiments and statistically explores how the participants' demographic and socioeconomic characteristics may in fact explain variations in their experimental behavior. The section starts with the main distributions of the decisions made by player 1s in the three core games and continues with the strategic data (schedules) on player 2s in the UG and player 3s in the TPG.

Player 1 Offers (Core Games): Driven by Strong Fairness Norms

In our sample, the same thirty people were player 1 in both the DG and UG, and another thirty people were player 2 in both games, although the pairing was not fixed from one game to the other. Recall that player 2 does not know the decisions of player 1 in the DG at the time he or she has to decide on a schedule of rejections for the UG. In the TPG game, we had thirty-two trios. All offers are summarized in figure 16.5. The offers could only be made in units of ten, since we endowed player 1s with 10,000 Colombian pesos (COP$10,000) in bills of $1,000.

The median and distribution of offers are highly consistent with previous work with these experiments in which fair offers of 50 percent of the initial stake were most frequently made by player 1s. For all three games, the modal offer was half of the initial stake. Reported offers in the experimental literature using the DG with both students and nonstudents are below the 50 percent average (Cardenas and Carpenter 2008).[4] In our UG the modal offer of half the stake was made by 70 percent of the participants, which is consistent with the literature that reports increased fair offers under the conditions of the UG.

These data bring up a few points regarding fairness behavior by player 1s that are worth discussing. Notice in figure 16.5 that the frequency of low offers decreased from the DG to the UG. Also, the 50 percent offers increased from 43 to 70 percent. The possibility of a very costly punishment created by a rejection in the UG induced, on average, more fair offers from player 1s compared to their offers in the DG. However, it is interesting to note that 57 percent of our player 1s maintained their exact offers from the DG to the UG and that 27 percent increased their offers. In fact, eight out of the thirty player 1s increased their offers from the DG to the UG, and five of them—two of whom had originally offered 90 percent and 70 percent of the stake in the DG—decreased their offers. There is a strong statistical pairwise correlation between the offers (pairwise correlation = 0.5700, p-value = 0.0010), and we fail to reject the hypothesis that the two distributions are statistically different. A Wilcoxon matched-pairs signed rank test for the thirty pairs of observations yields a z value of −0.709 with a Prob > $|z|$= 0.4780, and a simple t-test also supports the idea that the two distributions are equal, with a minuscule difference in mean offers of Col$0.06 (about 0.7 percent of the initial stake), a t-test = −0.2842, and a $p > |t|$= 0.7783.

Therefore, the ultimatum game rule structure increases the chance of fifty-fifty splits. In this community, it seems that there are already strong preferences for fairness and equal splits even under the less strategic dictator game. Later we discuss the behavior of player 2s in the UG to help explain these behaviors in player 1s. As we will observe, the likelihood of rejection by player 2s in the UG is rather low compared to similar experimental evidence and further confirms the proposition of very strong hyper-fair norms among these social groups. This is highly consistent with the fair offers in both the DG and UG.

The offers for the third-party punishment game deserve additional comments. As we can see in figure 16.5, the fifty-fifty offers in the TPG were less frequent than in the UG; offers of 20 percent and 30 percent of the initial stake were more frequent in the TPG. On average, the offers in the TPG were similar to those in the DG and slightly smaller than those in the UG.[5] The differences are not statistically significant, but this could be because of the limited sample size of thirty and thirty-two observations, respectively.

Player 2 Strategies of Rejection and Punishment: Driven by Hyper-Fairness, Aversion to Inequality for Some, and Conformism for Others

The data on player 2s for the UG and on player 3s for the TPG enrich our understanding of the Sanquianga people and their strong social preferences. Recall that in both games we used the strategy method: player 2s' strategy of rejection (UG) or punishment (TPG) would be elicited before they knew player 1s' offers but when they did know that player 1s had already made their decisions. Since the design and sequence of decisions was common knowledge for all players, we assumed that this strategic environment might affect the behavior of player 1s.

We have the benchmark of the canonical game-theoretical model prediction. UG player 1 should send the minimum nonzero offer assuming that player 2 would be better off. Since player 3 in the TPG derives no positive material gain from punishing and player 2 cannot affect player 1's well-being, player 3 should offer zero. However, once player 1s assume that the preferences of player 2s in the UG or TPG include a component of fairness, care for others, or equality, player 1s should rethink their strategies, even for the case of the Homo economicus, who would maximize their earnings by offering fractions that guarantee an acceptance in the UG or that reduce the probability of punishment in the TPG.

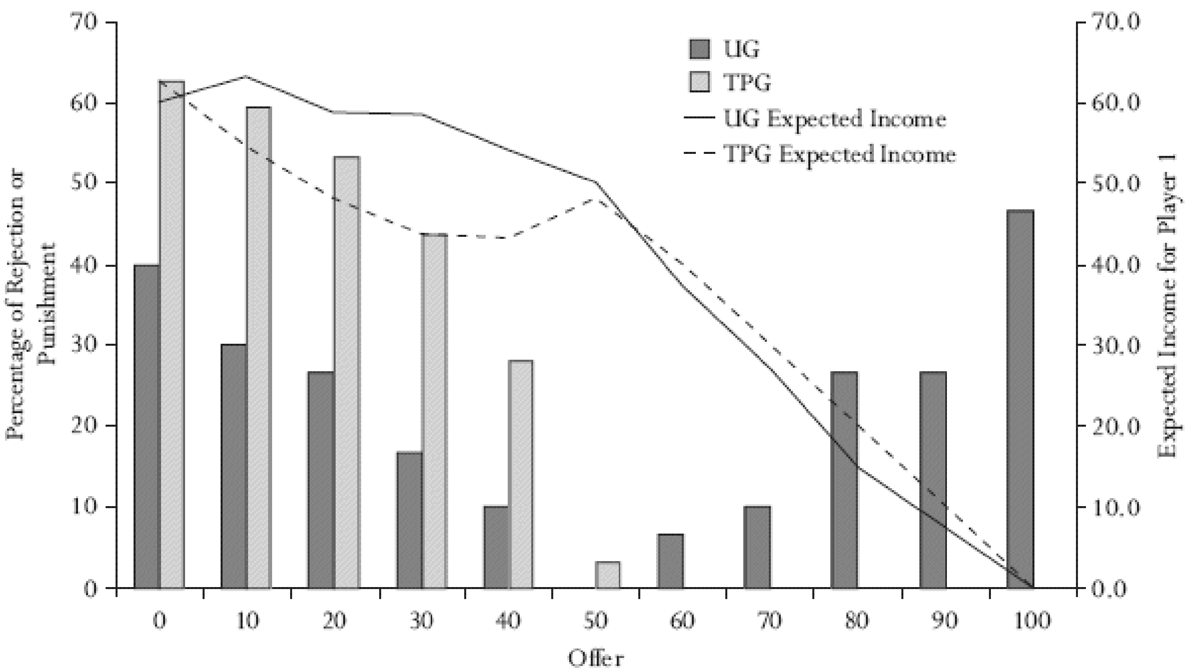
Table 16.5 and figure 16.6 show the frequencies of rejection and punishment for the UG and the TPG. The first and most interesting result is the U-curve for rejections in the UG. We find that very unfair offers were much more likely to be rejected, even if they were unfair to player 1 and favorable to player 2. The zero rejection rate for the fifty-fifty split confirms the preference for highly fair distributions.

TABLE 16.5 *Frequency of Rejection in the Ultimatum Game and Punishment in the Third-Party Punishment Game and Expected Income for Both Games*

Offer	UG Count	TPG Count	UG Rate of Rejection	TPG Rate of Punishment	UG Expected Income	TPG Expected Income
0	12	20	40%	62.50%	60.0%	62.5%
10	9	19	30.00	59.38	63.0	54.4
20	8	17	26.67	53.13	58.7	48.1
30	5	14	16.67	43.75	58.3	43.8
40	3	9	10.00	28.13	54.0	43.1
50	0	1	0.00	3.13	50.0	48.1
60	2	0	6.67	0.00	37.3	40.0
70	3	0	10.00	0.00	27.0	30.0
80	8	0	26.67	0.00	14.7	20.0
90	8	0	26.67	0.00	7.3	10.0
100	14	0	46.67	0.00	0.0	0.0

Source: Author's compilation based on author data.

FIGURE 16.6 *Frequency of Rejection in the Ultimatum Game and Punishment in the Third-Party Punishment Game and Expected Income for Both Games*



Source: Author's compilation based on author data.

However, a more detailed look at the individual data reveals a more complicated story about the behavior of player 2s in the UG. Looking at the

individual schedules elicited from these thirty people, roughly half (fourteen) of them accepted all possible offers from 0 percent to 100 percent, and the remaining half (sixteen) responded by rejecting unfair offers based on the U-curve shown in figure 16.6. Table 16.6 shows the individual accept/reject schedules, with each row being one player 2. The data are sorted by the percentage of rejections, where ones are accepted offers and zeros are rejected offers. The first column shows the amounts these players actually received based on the offers made by player 1s and their rejection. The last column shows the percentage of offers accepted for that particular player 2.

Notice the symmetry in the responses in table 16.6 for those with rejections (zeros), including four cases where player 2s would accept any offer except when player 1 offered the entire 100 percent of the stake. Toward the bottom of the table we have more hyper-fair individuals who would accept only very equal offers.

These data offer a puzzle regarding social preferences. Most people seem to value high fairness and altruism, and their behavior does not seem to show highly self-oriented choices with respect to material payoffs. However, we observe this behavior in two types of individuals: those who greatly value fairness and are willing to forgo income when the distribution is unequal, and those who are conformist with any distribution. Notice that the latter could be of the first type as well: if they are certain that no unequal offers will be made, then they know that a fair distribution does not need to be enforced (rejection). A look at the qualitative data in the next section may enrich the analysis of these experimental data.

What Did Player 2s in the Ultimatum Game Say About Their Rejection or Acceptance Strategy?

We now explore some of the arguments that may explain player 2s' responses to the survey at the end of the experiment. The following are answers to the question “How would you have felt if you received an offer of zero from player 1?” that were given by those player 2s in the upper half of table 16.6, that is, those who accepted any possible offer by player 1:

- “Well, it would be the will of the other person; it was him who would share from his heart.”
- “I'd feel fine, because each person has her own way of thinking.”

- “I'd feel bad, but I could not do anything.”[6]
- “I'd feel fine because this is what their heart and conscience told them to do.”
- “Fine, relaxed, because I cannot force their mind.”
- “Fine, I'd accept what their conscience would tell them.”
- “Relaxed, the other person could take all the money, The One up there [God] told him to.”
- “Fine, because it was the decision of the other person.”
- “Two things, I'd be an unfair person [not accepting], or maybe the other person needed the cash, that's why I accepted all.”
- “Fine, anyway, the other person took something home.”
- “I wouldn't feel anything, because it was a present.”
- “I decided to accept whatever the other person sent me.”

TABLE 16.6 *Schedules of Acceptances by Thirty Player 2s in the Ultimatum Game*

Player 2: Offer Received	Player 2: Accept 0	Player 2: Accept 10	Player 2: Accept 20	Player 2: Accept 30	Player 2: Accept 40	Player 2: Accept 50	Player 2: Accept 60	Player 2: Accept 70	Player 2: Accept 80	Player 2: Accept 90	Player 2: Accept 100	Sum Accepted (Player 2: Sum Accepted)
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
4,000	1	1	1	1	1	1	1	1	1	1	1	100%
2,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
3,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	1	100%
5,000	1	1	1	1	1	1	1	1	1	1	0	91%
5,000	1	1	1	1	1	1	1	1	1	1	0	91%
6,000	1	1	1	1	1	1	1	1	1	1	0	91%
5,000	1	1	1	1	1	1	1	1	1	1	0	91%
5,000	0	1	1	1	1	1	1	1	1	1	0	82%
5,000	0	1	1	1	1	1	1	1	1	1	0	82%
8,000	0	0	1	1	1	1	1	1	1	1	1	82%
5,000	0	0	0	1	1	1	1	1	1	1	1	73%
4,000	0	1	1	1	1	1	1	1	0	0	0	64%
5,000	0	0	0	1	1	1	1	1	0	0	0	45%
3,000	0	0	0	1	1	1	1	1	0	0	0	45%
5,000	0	0	0	0	1	1	1	1	0	0	0	36%
0	0	0	0	0	0	1	1	1	0	0	0	27%
5,000	0	0	0	0	1	1	0	0	0	0	0	18%
0	0	0	0	0	0	1	1	0	0	0	0	18%
5,000	0	0	0	0	0	1	0	0	0	0	0	9%
Accepted	60%	70%	73%	83%	90%	100%	93%	90%	73%	73%	53%	
Rejected	40%	30%	27%	17%	10%	0%	7%	10%	27%	27%	47%	

Source: Author's compilation based on author data.

And these are the answers by the same group of players (in the upper section of table 16.6 accepting all possible offers) to the next question in the questionnaire: “How would you have felt if you had received an offer of 10 from player 1?”

• “Fine.”

• “Fine, their hearts told them to send all the money to me.”

• “Fine too, because it was their decision.”

• “Fine, I'd be thankful.”

• “Happy, but why wouldn't they take any money?”

• “Fine.”

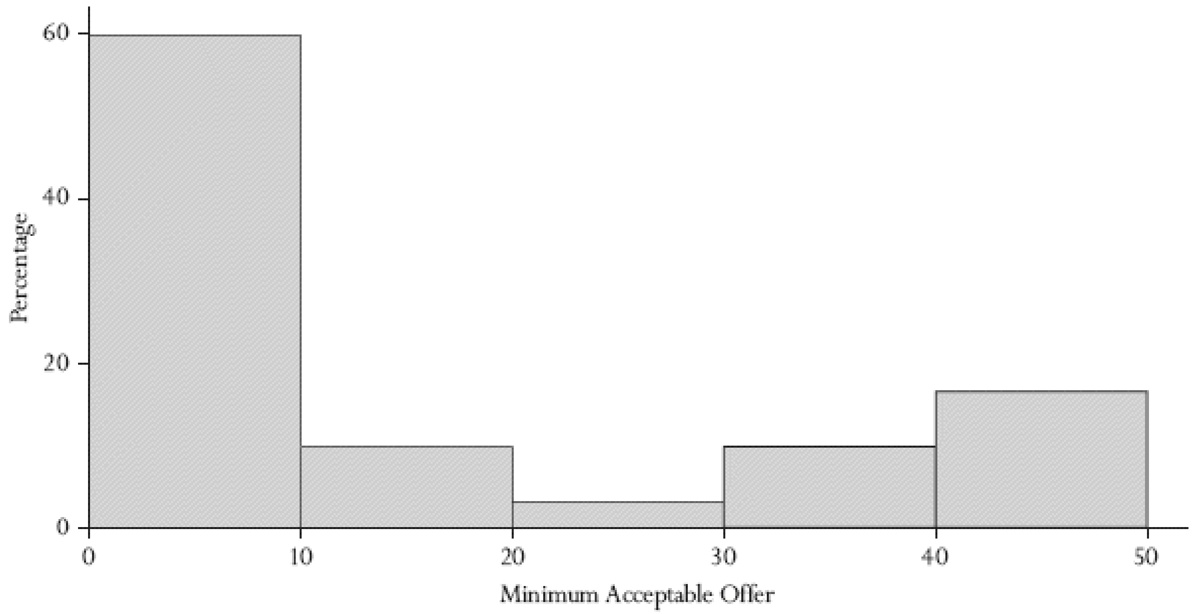
• “Fine, because it was voluntary.”

- “The other person gave me all, therefore I wouldn't feel bad.”
- “Bad, because it is better to share.”
- “It's not right, I cannot use all the money.”
- “I'd feel uncomfortable.”
- “I will feel bad because I know that it's the decision of the other person, but it would not be fair that he does not get any money.”

Although the latter player 2s show some remorse for getting 100 percent offers, they still accepted all offers in their decision schedule. If we look at the responses given by those in the bottom of table 16.6 with the hyper-fair responses, their reactions to receiving a 100 percent offer from player 1 support the argument that there is a discomfort with unfair outcomes:

- “I'd feel bad, because the other person would not keep anything.”
- “Bad, because the money belongs to the other person, and how come they would give it up all?”
- “Bad, because we have to share.”
- “I won't accept!”
- “I'll feel bad, but otherwise happy.”
- “Good for me but bad for the other.”
- “I don't think the conscience of the other would do that.”
- “Bad too.”
- “Bad because none of us win.”
- “Bad, because I think the other must share half and half.”
- “Bad, because the other person did not take any money, it's much better to share.”
- “Fine and relaxed.”
- “Fine because it's a choice of the other person.”

FIGURE 16.7 *Frequency of Minimum Acceptable Offers for Player 2s in the Ultimatum Game*



Source: Author's compilation based on author data.

Except for the last two, most player 2s expressed a negative sentiment about taking all the money and a strong preference for fair outcomes. The players choosing schedules with both very low and very high offers were rejected.

The strategy method in the UG can provide another valuable measure: the minimum acceptable offer (MinAO) of player 2s, which is calculated based on the smallest percentage that they would accept in the ultimatum game. We have two particular situations regarding this measure for the Sanquianga people. First, 60 percent of our sample had an MinAO of 0 percent, which yields a bimodal distribution as shown in the histogram in figure 16.7. Second, the hyper-fair rejections would not be reflected in the way the MinAO index is constructed, and therefore it does incorporate these additional components in the preferences. As we will see later when explaining the variation of experimental behavior in the multivariate analysis, we obtained nonsignificant results for the models explaining the MinAO variation.

It is worth noting that these combinations of behavior (fair and altruistic offers by player 1s to player 2s, whose responses are half conformist and half hyper-fair) resulted in a high number of accepted transactions (only two

of the thirty offers were rejected). The distributions of offers in the DG and the UG are not very different in terms of fairness and altruism. Player 2s seem to elicit, with their rejection schedules, preferences similar to such fair behavior. We therefore would have more reason to argue that generosity in the UG is based on the well-being of others and an aversion to inequality than on fear of negative reciprocity (Fehr and Schmidt 1999).[7]

Willingness to Punish Unfair Offers in the Third-Party Punishment Game

We also conducted the third-party punishment game, using the strategy method for player 3s, who had to reveal their schedules of punish/not punish for every possible decision by player 1s. The data are shown in table 16.6 and figure 16.6. When player 1s offered nothing, 62.5 percent of player 3s were willing to punish. Thereafter, the rate of punishment decreased in a concave, smooth rate down to 28 percent of player 3s being willing to punish a 40 percent offer from player 1.[8] Offers of 50 percent and higher were not punished by player 3s.

This behavior is consistent with the argument that humans are willing to undertake costly actions in order to maintain social norms that are beneficial to the group (Fehr and Fischbacher 2004; Fehr and Gächter 2002). We have already observed from the DG and UG data that fairness and equality are strong social norms that are not only demonstrated by player 1s but also expected by player 2s. These are norms that player 3s would be attempting to sustain through the costly behavior of having to pay 20 percent ($2,000) of their initial stake (COP$5,000) to decrease the payoffs of player 1s (by COP$3,000). In fact, the data for the Sanquianga people are quite similar to the concave schedule reported by Ernst Fehr and Urs Fischbacher (2004) for the same experiment, although in their study the fraction of people willing to punish unfair offers remained at 60 percent for offers up to 40 percent from player 1s. In our study, when offers were for 40 percent, only 30 percent of player 3s were willing to punish.

The individual data on the punishment schedules and the offers by players can provide some additional insights. Only four (COP$2,000, $3,000, $4,000, and $3,000) of the thirty-two offers were in fact punished by player 3s. However, recall that there were more offers in the TPG that were less generous than in the DG and UG. There were at least five cases in which

a player 1 offered 30 percent or less, and these happened to be matched with player 3s who were not interested in punishing any of these offers.

Explaining Experimental Behavior from Demographic Characteristics

The next step in the analysis is to further explore the observed variation in the key choice variables in our sample by exploring the data collected about the behavioral, social, and economic conditions of these individuals. We have found aggregate patterns that are consistent with similar literature and experiments and the role of norms such as fairness, reciprocity, and altruism across the three core games. However, players varied in their individual preferences for altruism, reciprocity, and social sanctioning.

Since we gathered demographic and socioeconomic information about the participants and their households, we can explore how much of their individual and household characteristics could explain the variation across their individual decisions within the experiments.

The dependent variables we aim to explain are the offers by player 1s for the three core games and the minimum acceptable offers for the ultimatum game, since it is being calculated for all sites in the project. The regression results are included in tables 16.7 through 16.10.

The statistical procedure for all subsamples was similar to the protocol for the entire project. The explanatory (independent) variables chosen for the regressions were age, gender, education, individual income, household wealth, and household size. To explore the robustness of some of these variables and explain variation in the dependent variables, we report different models. We compare coefficients of variables in different units by dividing each value by the standard deviation of the subsample.

Dictator Game Offers According to the different models we estimated, we are able to explain about 40 percent of the variation in offers using the thirty players' personal and household characteristics (see table 16.7). Overall the models' significances allow us to draw some conclusions about the changes caused by these characteristics in the independent variables because they existed prior to the experiment. Based on the regression results, and given that we have transformed the variables, the estimation results show that years of education and household size had a significant and positive effect

on the amount offered by player 1s, while the effect of household wealth was negative. Given that individual income was not found to be correlated with household wealth, we suggest that income has no effect by itself. In terms of the relative weight in explanatory power, household size and education seem to be similar in having a higher effect than wealth.

TABLE 16.7 *Dictator Game Offers Explained by Demographic Variables*

Variables (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	1.47			
	(3.43)			
Female dummy[a]	4.69	4.19		
	(6.73)	(6.51)		
Education	9.36	8.27	8.21	8.23
	(3.82)**	(2.80)***	(2.76)***	(2.69)***
Individual income (U.S. dollars)	1.05	0.97	−0.19	
	(2.96)	(2.91)	(2.25)	
Household wealth (U.S. dollars)	−5.17	−5.28	−5.33	−5.34
	(2.54)*	(2.48)**	(2.45)**	(2.39)**
Household size	11.04	10.89	10.56	10.56
	(2.84)***	(2.77)***	(2.69)***	(2.64)***
Constant	5.47	11.43	16.46	16.24
	(18.48)	(11.90)	(8.88)*	(8.34)*
Observations	30	30	30	30
Model significance (*p*-value)	0.009	0.004	0.002	0.001
Adjusted R-squared	0.37	0.39	0.40	0.43

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses.
* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent
[a]Not divided by the standard deviation.

Ultimatum Game Offers With the first model (see table 16.8), we can explain about 50 percent of the variation and have a significant model. Once again, gender does not seem to have explanatory power. Education, household size, and wealth have the same effects on offers. This result is expected given that these are the same thirty people and the dictator game and ultimatum game offers were highly correlated for the sample. Only age, now showing a positive significant coefficient, and income, with a negative significant effect, add to the explanatory power of the estimator.

Minimum Acceptable Offer Responses The results here are rather weak when compared to the estimations of the dictator and ultimatum games (see table 16.9). The only model with a statistically significant explanatory

power, model 5, shows age and wealth as significant and positive in both cases, explaining a very small fraction of variation in the MinAO responses. The adjusted R-squared is only 14 percent. Most of the statistical problem lies in the data for the dependent variable. We know that about 60 percent of our participants were basically indifferent to any offer, that is, their MinAO was zero. Therefore, the results reported here should be interpreted with caution.

TABLE 16.8 *Strategy Method Ultimatum Game Offers Explained by Demographic Variables*

Variables (Divided by Standard Deviation)	(1)	(2)
Age	5.23	4.96
	(1.99)**	(1.94)**
Female dummy[a]	3.08	
	(3.90)	
Education	8.71	8.46
	(2.21)***	(2.17)***
Individual income (U.S. dollars)	−1.52	−2.36
	(1.72)	(1.33)*
Household wealth (U.S. dollars)	−4.93	−4.98
	(1.47)***	(1.46)***
Household size	4.48	4.21
	(1.64)**	(1.60)**
Constant	15.24	19.92
	(10.70)	(8.85)**
Observations	30	30
Model significance (*p*-value)	0.001	0.000
Adjusted R-squared	0.49	0.50

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses

* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent

[a]Not divided by the standard deviation.

TABLE 16.9 *Minimum Acceptable Offers by Player 2s in the Strategy Method Ultimatum Game*

Variables (Divided by Standard Deviation)	(1) mao	(2) mao	(3) mao	(4) mao	(5) mao
Age	8.12	8.23	7.16	7.62	6.89
	(3.61)**	(3.53)**	(3.47)**	(3.45)**	(3.18)**
Female dummy[a]	2.57				
	−7.69				
Education	4.69	4.62			
	−3.72	−3.65			
Individual income (U.S. dollars)	5.79	5.15	3.34		
	−4.01	−3.47	−3.19		
Household wealth (U.S. dollars)	6.27	6.29	6.05	5.98	5.81
	(3.26)*	(3.20)*	(3.23)*	(3.23)*	(3.18)*
Household size	−0.84	−0.78	−1.6	−2.02	
	−3.49	−3.42	−3.4	−3.38	
Constant	−27.22	−25.02	−9.95	−5.58	−9.06
	−18.42	−16.89	−12.13	−11.4	−9.67
Observations	30	30	30	30	30
Model significance (p-value)	0.193	0.12	0.124	0.1	0.049
Adjusted R-squared	0.11	0.14	0.12	0.12	0.14

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses.

* Significant at 10 percent; ** significant at 5 percent

[a]Not divided by the standard deviation.

TABLE 16.10 *Third-Party Punishment Game Offers Explained by Demographic Variable*

Variables (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	1.65					
	(2.82)					
Female dummy[a]	8.37	7.55				
	(6.27)	(5.96)				
Education	−3.86	−5.05	−4.61	−4.69	−5.39	−4.61
	(2.75)	(2.54)*	(2.55)*	(2.62)*	(2.66)*	(2.55)*
Individual income	−3.95	−4.58	−6.41	−5.39	−5.64	−6.41
(U.S. dollars)	(3.03)	(2.95)	(2.60)**	(2.59)**	(2.66)**	(2.60)**
Household wealth	5.91	5.24	4.53			4.53
(U.S. dollars)	(3.01)*	(2.85)*	−2.83			−2.83
Household size	1.68	1.71	2.41	4.32		2.41
	(2.87)	(2.82)	−2.79	−2.59		−2.79
Constant	33.25	41.11	44.21	41.8	54.83	44.21
	(12.48)**	(9.38)***	(9.16)***	(9.28)***	(5.15)***	(9.16)***
Observations	31	32	32	32	32	32
Adjusted R-squared	0.24	0.26	0.24	0.2	0.15	0.24
Prob > *F*	0.043	0.023	0.02	0.025	0.034	0.02

Source: Author's calculations based on author data.
Note: Standard errors are in parentheses.
* Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent
[a]Not divided by the standard deviation.

Third-Party Punishment Game Offers Although the overall significance of the models estimated for these thirty-two observations is slightly stronger here than in the previous case, the results need to be interpreted with caution (table 16.10). The estimation suggests that some of the coefficients and signs that were statistically significant in the DG and UG data now have effects that are similar in some cases and not in others. Education seems to reduce the amount being offered. Income now shows a negative and significant relationship, while wealth is positive.

The positive sign for wealth could be interpreted in two ways. First, wealthier people were more generous, contradictory to the DG and UG data, owing to the lesser value of their forgone cash as a percentage of their average income. Second, wealthier people expected to be punished more often by third parties, although in this case player 1s knew that player 3s could not identify at any point who was in fact being punished.[9] At this point, it is difficult to reject either interpretation. Nevertheless, the motivation for wealthier player 1s to make higher offers because they expect to be more strongly punished remains a plausible explanation.

Household size is no longer a powerful explanatory variable of the variation in offers. Nevertheless, the different models were, at best, able to explain about one-fourth of the variation in offers. It is worth noting that other variables for tenure—measures of the percentage of time the individual had lived in the village or of engagement in cooperative activities in the village—did not help to statistically explain the variation in experimental offers.

In general, wealth, age, household size, and education seem to be factors that statistically explain the behavior in the estimated models. These factors offer some grounds for arguments about individuals' possible motivations for their prosocial behavior in these experiments. These arguments are discussed in the next section.

TABLE 16.11 *Frequency of Offers by Player 1s in the Sealed-Envelope Dictator Game*

Offer (U.S. dollars)	Frequency	Percentage
$0	0	0%
$1,000	0	0
$2,000	1	7
$3,000	4	27
$4,000	8	53
$5,000	2	13
$6,000 or more	0	0
Total	15	100

Source: Author's calculations based on author data.

A Variation of the Dictator Game: Using Sealed Envelopes and a Drop Box

Concerned about experimenter effects in our prosociality experiments, we expanded our sample by recruiting fifteen new pairs in one of the two villages, Bazán, to play the dictator game in the same exact manner as before. They were recruited in the same way as in the earlier round of the DG, player 1 and 2 roles were once again randomly assigned, and communication among the participants during the experiment was forbidden. There was one difference, however, in this variation on the DG: player 1 made his or her decision in private, not in front of the experimenter but in a different room, where player 1 could have the privacy to keep the money he or she wanted, leave the money offered in a sealed envelope, and deposit the

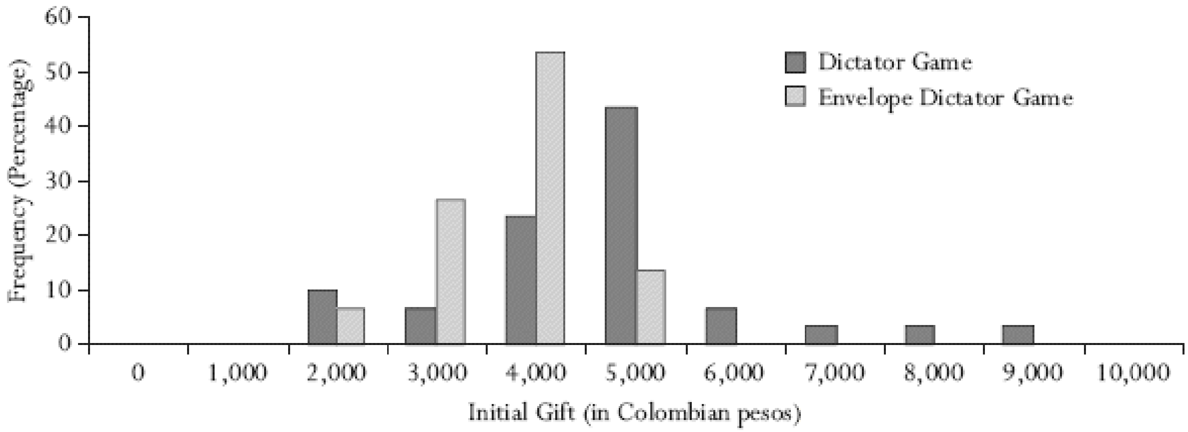
envelope in a drop box in that room with no one present. Once all fifteen offers were made, the experimenter randomly handed out the fifteen envelopes to the fifteen player 2s.

Table 16.11 shows the distribution of offers by the fifteen player 1s. If we compare the distribution of offers to those observed in the initial DG sample (See figure 16.8), we can notice a similar pattern: offers were more concentrated around the 40 percent offer, and there were no hyper-generous offers of more than 50 percent of the stake. Two nonparametric tests for comparing these distributions suggest that the offers are statistically different (Kolmogorov-Smirnov test, p = 0.013; Wilcoxon rank sum (Mann-Whitney), p = 0.0102).

These results suggest at least two conclusions that are not mutually exclusive. First, there is room to suspect an experimenter effect that shifts the distribution slightly to the right, including the possibility of extremely generous offers being driven in part by participants trying to impress the experimenter. I should not exclude, however, the possibility of learning in the Bazán village, given its small size and the usual excitement that these games produce in the village. This variation of the DG was conducted after we had conducted the core games, and therefore the villagers may have been communicating with each other, although speculating on the direction of the effect could be risky.

The second conclusion is that despite these possible shifts in the distribution of offers, this design and data confirm that generosity is a strong motivator in the same population where the other games were conducted and as discussed in the analysis here. Only one offer was for 20 percent of the stake; the remaining fourteen offers were 30 percent and higher, with a mean offer of $3,700 (37 percent of the stake), compared to the 47 percent found in the larger sample for the initial DG. The analysis explains why such levels of prosociality might be based in both the historical and current contextual situations of the people of Sanquianga.

FIGURE 16.8 *Distribution of Offers in the Initial Dictator Game and in the Sealed-Envelope Dictator Game*



Source: Author's compilation based on author data.

THE ROOTS OF SOCIAL BEHAVIOR AND PREFERENCES IN SANQUIANGA

Using the demographic, socioeconomic, and experimental data gathered in the field and from secondary sources, this section discusses the foundations for the social preferences and prosocial behavior observed in the experiments among the Sanquianga people.

Strong and Symmetric Aversion to Inequality

There are strong preferences among the Sanquianga people for altruistic and fair outcomes. There is also a strong social acceptance of symmetric fairness and a strong aversion to unequal outcomes regardless of the direction, even at a cost in efficiency. The data, in fact, do not replicate the typical asymmetric pattern in rejection schedules in the ultimatum game, in which players were willing to reject offers that were unfair to them but would accept most offers that were generous to them. The Sanquianga data present a very symmetric rate of rejections and acceptances. For about half of the people tested, any division of the money was acceptable, and for the other half, only very equal divisions were acceptable. This has been labeled a "hyper-fair" set of preferences.

Thus, inequality aversion is much stronger here than would be proposed by Ernst Fehr and Klaus Schmidt (1999), who assume a smaller disutility from advantageous inequality than from disadvantageous inequality. Our data suggest that the weights observed are quite symmetric, yet they also vary from very conformist to very (symmetrically) averse to inequality across individuals.

Respondents' answers to questions about receiving very unfair or very generous offers suggest that inequity aversion may play only a partial role and that pure altruism was a much stronger preference among them than is usually observed. The fact that the offers in the dictator game were already generous and fair, compared to those in the ultimatum game, suggests that pure altruistic preferences played a significant role in Sanquianga decisions.

Such highly altruistic preferences by the player 2s who accepted any offer and by the player 1s who offered very fair offers are quite consistent with observed behavior in the field. When Sanquianga households, for instance, had a “bad catch day” while fishing, they received transfers from neighbors who did better, knowing that such transfers could go in the opposite direction in the future.[10] Participants reported during the follow-up conversations food was frequently transferred in cases of illness or need.

Interestingly, a recent experiment among the Gypsy population of Vallecas, Madrid (Brañas-Garza, Cobo-Reyes, and Domínguez 2006), using a replication of the strategy method ultimatum game with the same protocols as the present study, generated results that are compatible with the arguments here. The mode for the rejection by player 2s was zero. However, 97 percent of player 1s offered 50 percent of their stake. The argument remains that if the social norm among this particular group is for everyone to share any surplus they might have, they might as well accept any offer and avoid the risks of a rejection that would destroy any output to be divided. The Gypsies themselves, however, more frequently justified their lack of rejection of most offers as based on the deservedness of the other (“Si él lo necesita”). If player 1 needs the cash, he will keep it and that is fine with player 2. Donna Bahry and Rick Wilson (2006) also report a very high portion of 50 percent offers from player 1s for a set of experiments with different rural and urban individuals in two ex-Soviet republics.

Fair offers in the ultimatum game therefore could be interpreted as altruistic decisions by player 1s rather than decisions based on a strong fear of reciprocal rejection by player 2s. Although a small fraction of the offers

moved toward the fifty-fifty split afterward, recall that seventeen out of thirty player 1s offered the same amount in both the DG and the UG, and that eleven of these offered the fifty-fifty split.

Therefore, if such a strong social norm exists, it is rational to have observed hyper-fair rejection rates where about half of player 2s accepted any offer. These players were trying to reduce the risks of a rejection that would produce no payoffs at all for anyone. In other words, not only was there a strong preference for the well-being of the others present in the experiments, but there was also a strong preference for the highest possible sum of the payoffs rather than equity between the payoffs. Combined with a common understanding that fair outcomes were the norm, it would be logical to observe the two types of behaviors in the respondents (conformists and hyper-fairness enforcers).

However, the strategic behavior of player 3s in the TPG presents another puzzle in the debate over hyper-fair versus conformist preferences among this social group. If we argue that hyper-fair or conformist preferences are generally held by this population, why would player 3s have punished only offers that were unfair to player 2s and not also those that were excessively unfair to player 1s? On the contrary, a conformist player 3 who accepts that player 1 keeps all of the stake should not punish any offer by player 1. The fact that the social interaction has no monetary effect on player 3 could be part of the argument. The responses given by player 2s in the UG and reported in previous sections suggest that hyper-fair individuals in Sanquianga had a strong feeling against receiving too much and leaving player 1s with nothing, a feeling that player 3s in the TPG would not have perceived personally. In the TPG the punish decision by player 3 only affects the earnings of player 1, by decreasing them, without altering the earnings of player 2.

Poverty, Wealth, and Prosocial Behavior

Many of the arguments about sharing excess goods are related to caring for an equal distribution of resources and opportunities, especially for those in greater need. This raises the issue of the role of private wealth and income in sharing networks and small-scale societies. Our results suggest that wealthier households or individuals with higher (cash) income are less likely to share in the DG and UG.[11] These findings would be consistent with the rationale

that poorer people are more familiar with sharing, or with others similar to them being in need, and therefore found in the experiment another situation in which others would need part of the newly available resources (in this case an amount of cash arriving from outside, and in particular from the experimenter).

We have argued that poverty or lack of private wealth (assets) might be associated with more altruistic preferences, owing to respondents' personal history of participating in exchanges based on altruism or solidarity. When there is less wealth among one's neighbors, one may be more likely to engage in sharing activities with other poor individuals. Since the experimental design was such that the sessions were conducted with people from the same settlement who were familiar with one another, then the immediate context could explain the likelihood that they would be more prosocial, at least when it came to sharing, as in the DG and UG. In previous experiments in rural villages in Colombia (Cardenas 2003), we found that individual wealth and the social distance created by it among eight villagers reduced the level of cooperation in the group participating in a common-pool experiment. Assuming that those with fewer private productive assets were more familiar with, or more likely to engage in, interactions based on prosocial norms such as fairness, trust, and reciprocity, we were able to devise and sustain a more effective cooperative agreement in the experiment.

Other experimental work on related preferences observed in public goods and common-pool resources would also suggest that individuals who have fewer private opportunities and are more dependent on reciprocal relationships are willing to act in more prosocial ways. Edward Buckley and Rachel Croson (2006) report on a series of experiments showing that, consistent with their analysis of charitable giving, less-wealthy people are willing to contribute an equal or greater percentage of their income than are the well-off. In other experiments run in the field (Cardenas et al. 2002), under asymmetric payoff structures in which a fraction of users of a common-pool resource have poorer private opportunities (or exit options), those users were more willing to engage in cooperative behavior than those with less income dependence on the common pool and better private options.

Further, the level of group poverty may have an effect on the reinforcement of social sharing norms. A small test across sites within our sample may raise evidence in this direction, although there are statistical limitations from the sample size. As mentioned earlier, we had to recruit

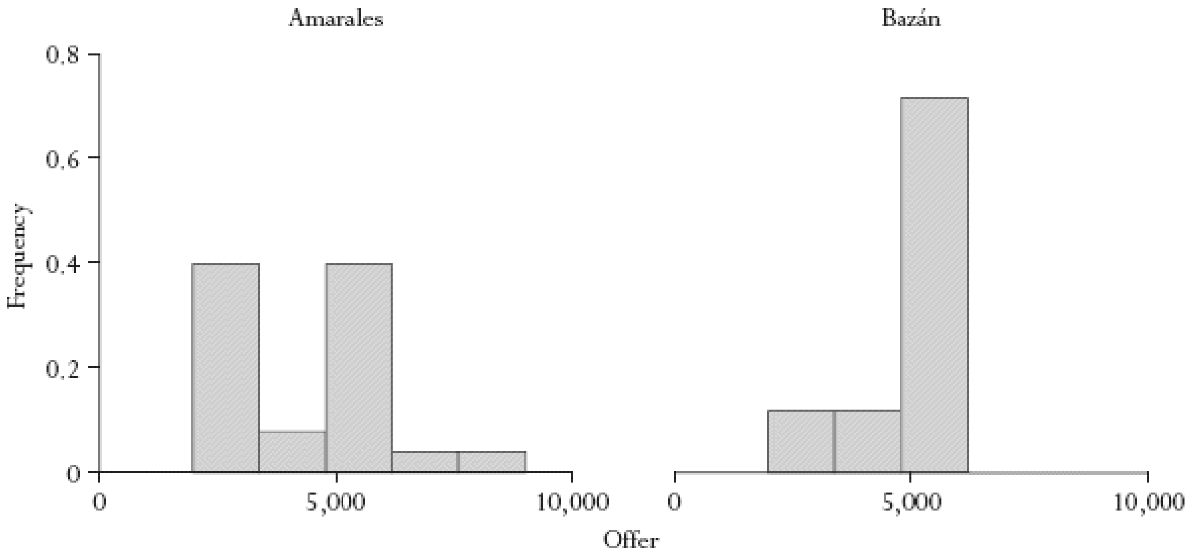
participants from two neighboring settlements in this location, Bazán and Amarales, in order to complete our sample. There were differences in the average distribution of income and wealth, Bazán being a village with a higher fraction of much poorer people than was the case in Amarales. *T*-tests for the two indices wealth and income confirm a statistical difference between the two settlements.

Since the only experiment we ran in both sites was the third-party punishment game, we can only compare offers across sites for this sample. The small sample size restricts the power of the statistical test, but we do observe a higher frequency of fifty-fifty offers in Bazán, as shown in figure 16.9. Although there is no statistical difference in the distribution of TPG offers by players in Amarales and offers by those in Bazán, fifty-fifty offers were clearly made more often in the latter.

DISCUSSION: BACK TO HISTORY

Over the last three centuries, the history of human occupation of the mangrove forest on the Pacific Coast of Colombia has shown a set of patterns that include a permanent interaction with and high dependence on the ecosystem—and therefore on resolving the common-pool dilemma by devising institutions that align the interests of the individual and the group. For such institutions to work—at least in these regions where external enforcement by the state is relatively rare—social groups must comprise individuals who have more prosocial preferences in terms of fairness, altruism, reciprocity, and cooperation (Ostrom 1998).

FIGURE 16.9 *Distribution of Third-Party Punishment Game Offers by Player 1s in Amarales and Bazán*



Source: Author's compilation based on author data.

The history of these settlements has also shown that informal social networks and acts of solidarity are essential to survival and may be a response to the state's capacity to provide public goods and infrastructure to this region compared with other rural regions in the country. Restrepo (1996b) highlights the importance of relations of solidarity among the black slaves and among the indigenous population on the Pacific Coast during the slavery eras in mining. Before slavery was abolished, some slaves were able to buy their own freedom by working on the weekends, when, for cultural and religious reasons, the encomienda and mining enterprises did not operate. Early settlements of free slaves and cimarrones (slaves that had escaped), called palenques, emerged at a time when extractive economic activity—from the mining of gold to the extraction of caucho and tagua, logging, and the exploitation of other valuable resources, depending on the period—operated in the absence of a state and endogenous systems of rules. The concept of "minga" ("minga" refers to a communal institution where individuals in a village contribute with labor to a task that produces a public good) was also present in these coastal communities and in the upper Andean lands, where indigenous cultures had used it for millennia for collective action. However, minga has now been displaced by the idea of "cambio de mano," or hand-exchange, in which an individual "contributes"

with personal unpaid labor to producing something for someone else who will later reciprocate by giving the former an equivalent unit of unpaid labor (Restrepo 1996a). Therefore, the behavior in the experiments reported here was of no surprise to the observers and to the participants in informal interviews.

Fifty years before this study, another anthropologist, Thomas Price (1955), reported on the strength of the social preferences of the Afro-descendent people of this region. This passage, cited by Restrepo (1996b, 180), eloquently describes what the experiments in this study capture about the behavior of the Sanquianga people:

> Relatives, compadres and friends are accustomed to give each other whatever food which they have on hand over and above the immediate requirements of the family, especially to those who are known to be [in] need. Any individual can relate the names of many person[s] to whom at one time or another he has given food; some of these have eventually reciprocated, while the others may be called on when the need arises. As an instance of the way in which it works, the case may be cited of man who, though his neighbors declared that he had once been in a comfortable situation, had been without work for [some time]. Though he [had] no money [and] his prospect of [a] job [was] rather dim, both he and his wife seemed well fed. He was very much given to [taking] long walks, at the end of which he would inevitably return home with several large plantains, ucca, and the like, announcing that by chance he had encountered a friend who, after inquiring about his family [and] determining in the typically indirect way that the informant was in need, [had] given him these gifts. In conversation, it [became] clear that the one who had given him the food had in the past been in the same situation, and had benefited from similar gifts of food. (Price 1955, 20)

More than five decades have passed since Price described the prosocial behavior of the people of Sanquianga. Similar assessments were later made by another anthropologist, Nicole Pujol (1970), regarding the prosocial behavior of black communities on the Pacific Coast of Colombia. Her work was a biological and physiological anthropological study of blacks in the region, but in her notes she highlighted their higher levels of morality, hospitality, and abnegation compared to whites.

Not much has changed in the activities that support the livelihoods of the Sanquianga people and the social norms that support the reciprocal exchange of gifts among them. The experimental design we used in this project allowed us to explore the motivations for such behavior and ponder the reasons why fairness remains a strong motivator for action today, given the persistent levels of poverty still suffered in this region.

This chapter has definitely been a collective effort. My first thanks go to Lilliana Mosquera, who was the main research assistant in the field for these experiments. Ana Maria Roldán and Pablo Ramos also provided major assistance in the field, and Natalia Candelo processed the data. My colleagues Diana Maya and Maria Claudia Lopez played a major role in the field and in the experimental design and its adaptation to the context. Ximena Zorrilla and Carmen Candelo have always been very helpful with their enthusiasm and devotion in the field and toward the communities in Sanquianga. The people of Bazán and Amarales in Sanquianga deserve my gratitude as well, as does Eduardo Restrepo, a true scholar on the Pacific Coast social systems. Jean Ensminger, Abigail Barr, and Joe Henrich provided valuable inputs that made this a better chapter. An international fellowship from the Santa Fe Institute also provided ideal conditions for research.

NOTES

1. While the unemployment rate for the rest of the country is 11 percent, unemployment is at 14 percent for the Afro-Colombians living in various regions and mainly on the Pacific Coast. Primary schooling coverage is similar to the rest of the country. Secondary schooling reaches 62 percent of the population, while in the rest of the nation it reaches 75 percent. College-level education coverage is only 14 percent for this group, compared to 26 percent for the rest of the nation. The uninsured population encompasses 51 percent of the Afro-Colombians, while the rate is 35 percent elsewhere. Only 46 percent of the Afro-Colombian population has access to sewage systems, while such access has reached 81 percent in the rest of the nation. Further, 72.85 percent of the Afro-Colombian population are at high risk for malaria; in the rest of the country, less than one-third of the population is susceptible (Departamento Nacional de Planeación 2004).

2. The Spanish version of the protocols, instructions, and forms is available from the author.

3. In fact, such recruitment rules were easily enforced by the same pool of potential participants willing to participate if they saw two people from the same household in one session.

4. Juan-Camilo Cardenas and Jeffrey Carpenter (2008) surveyed papers from several studies in different countries around the world that had used the dictator game and thus should be more comparable to our study than those whose samples were college students in Western industrialized societies. For the Colombian student subject pools, the average offer was around 25 percent and ranged from 20 to 30 percent. For nonstudents, the average offer was 40 percent.

5. Pairwise comparisons are not feasible since the participant samples in the DG and the TPG were different. For the hypothesis that the UG offers were higher than for the TPG, we obtain a *t*-test ($t = 1.3306$, $p > t = 0.0942$), with an average difference in offers of COP$0.387, which is about 4 percent of the initial endowment.

6. This player knew that he could reject any offer he wished, but had decided to accept any offer.

7. We do not argue here that reciprocity is not playing a role in the experiments or in the daily social exchange of this society. On the contrary, reciprocity plays a major role for this group. Further, we argue later that ex post incentives outside of the field lab but within the subjects' group may also play a key role, as discussed in Cardenas (2004).

8. There was one player 3 who had chosen to punish a 50 percent offer and not to punish the rest of the superior offers. These decisions were double-checked with participants during the game.

9. In Cardenas (2004), I report a series of trust game experiments in which college students were recruited across four campuses and the only available information they had about the other player was

the player's university affiliation, which mapped accurately the player's predicted socioeconomic status. Offers by player 1s were smaller when they came from higher-socioeconomic-status private universities, and especially when they were offers made to students in public universities with middle- and low-income populations.

10. Eduardo Restrepo (1996b, 116) describes how the Sanquianga do not take the catch from a fishing day to the local market but rather keep it for the household and often share it with relatives, friends, and neighbors who may not have immediate access to fishing resources: "Los peces que se destinan para el autoconsumo, se utilizan tanto para el consumo doméstico como también pueden distribuir a los parientes o amigos cercanos que no tienen es ese momento acceso a ellos, o sea, que circulan por las redes de reciprocidad anotadas para el caso de la cacería o de la recolección."

11. Notice that while wealth has a negative effect on offers in the DG and UG, education has a positive effect. Since education and wealth are not correlated for this group, one could reject the argument that wealthier people behave closer to the Homo economicus prediction because they better understand the incentives and rules of the game.

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Chapter 17

The Effects of Birthplace and Current Context on Other-Regarding Preferences in Accra

Abigail Barr

One of the key findings from the first phase of the Roots of Human Sociality Project was that members of more market-integrated societies were more other-regarding, in the sense that they made higher offers in the ultimatum game. However, this finding was based on comparisons across experimental subjects drawn from a number of very small-scale societies in which livelihoods were either entirely or in large part based on hunting, gathering, and agricultural production for home consumption. This led to concerns that the monotonic relationship between individuals' other-regarding preferences and the extent to which the society in which they lived was market-integrated might not hold if we included individuals drawn from highly market-integrated societies in the analysis.

To address this concern in the second phase of the project, we added several new subject pools. One of these was a group of manufacturing employees in Accra, the capital city of Ghana. These urban-dwelling men and women are entirely dependent on the monetized economy for their livelihoods. They sell their labor for a wage, which they then use to buy food for themselves and their families. In addition, they are exposed to newspapers, radio, and television and hence to a diverse and far-reaching perspective on the human condition. In many regards, they are as market-integrated as the average U.S.-born undergraduate student. Unlike U.S.-born undergraduates, however, many of these individuals are relative newcomers to their context, having been born and raised in rural Ghana, where subsistence agriculture, combined with cash-crop farming, is still the norm. These individuals are particularly interesting as they have made a transition from a less to a more market-integrated context; as a result, their inclusion in our study may facilitate an analysis of when behavioral tendencies are determined in an individual's development. If individuals' other-regarding

preferences are developed early in life through primary socialization (Henrich and McElreath 2003; Karmiloff-Smith 1994; Lancy 1996; Meltzoff and Prinz 2002; Quartz 1999, 2002; Quartz and Sejnowski 1997, 2000; Tomasello 1999, 2000a, 2000b), then these migrants will display behavioral tendencies associated with small-scale agrarian societies even though, in their current lives, they are highly market-integrated. However, if individuals' other-regarding preferences remain malleable and are affected by changes in context, then these migrants will be behaviorally indistinguishable from their urban-born counterparts.

In this chapter, I investigate whether employees born in urban Ghana and employees who migrated to the city of Accra, having been born in rural Ghana, behave similarly or differently in a series of three behavioral games. The study focuses on a sample of 177 manufacturing employees, approximately two-thirds of whom were born in urban areas (mostly Accra), while the remaining third were born in rural areas and then migrated to Accra. Each of these employees took part in either a dictator game (DG) followed by an ultimatum game (UG), or a third-party punishment game (TPG). They also responded to a questionnaire designed to elicit information on a number of socioeconomic characteristics, including the nature of the place in which they were born.

The results of the study indicate that urban-born individuals make higher offers but may be more likely to accept low offers in the ultimatum game. Rural- and urban-born individuals behave indistinguishably in the DG and TPG. That the urban-born make higher offers lends further support to the conclusion of the first phase of the Roots of Human Sociality Project, but their greater likelihood of accepting lower offers does not; for consistency, we would expect them to be more rather than less inclined to reject low offers. That they are less inclined to reject low offers, but nevertheless make higher ones, suggests that sharing behavior is driven more by commonly internalized behavioral norms and less by the threat of punishment among the urban-born.

I begin by reviewing a number of micro-level theories that predict a relationship between market integration and other-regarding preferences. Then I introduce the sample of Accra-based manufacturing employees upon whom this study is based. I provide some background information about the contexts in which the subjects were born and now live, as well as descriptive statistics relating to their current socioeconomic characteristics. A section

follows in which I set out my approach to addressing the issue raised in this introduction, explain how the games were played, and describe how I analyzed the resulting data. After presenting the results of the analysis, I conclude with a brief discussion about the results.

MARKET INTEGRATION AND OTHER-REGARDING PREFERENCES

One of the original aims of our cross-cultural study was to empirically investigate the origins of individual other-regarding preferences. Several members of the project team had previously explored the processes by which other-regarding preferences may have evolved and been acquired by individuals. However, only one, Sam Bowles, had proposed that markets might play a role. In his paper on preference endogeneity (Bowles 1998), he proposed that institutional contexts—that is, the rules governing production and distribution—affect individuals' life choices and hence the development of their personalities, habits, tastes, identities, and values. The rules of market exchange provide a strong situational frame in which individuals respond to financial incentives instead of directly to other individuals. Thus, the relationship-specific investments that support personalized exchange are not required in market exchange and are less likely to be made as a result. And this being the case, market-integrated individuals are less likely to be other-regarding. But this suggests a negative correlation between market exchange and individual other-regarding preferences, whereas the cross-cultural study identified a positive relationship.

When later working in collaboration with Herbert Gintis, another member of the original project team, and Melissa Osborne, Bowles explored an alternative mechanism that could support the observed positive correlation. Bowles, Gintis, and Osborne (2001a, 2001b) subsequently presented a large body of evidence suggesting that employers value employees with behavioral characteristics that may be described as other-regarding. Because worker effort is not perfectly observable, employers have to rely on employees' willingness to reciprocate higher pay with greater effort, in accordance with George Akerlof's (1982) theory of gift exchange. Further, if work requires cooperation between employees, more cooperative employees are preferred. If other-regarding preferences are rewarded in the labor market, there is an incentive for young people—or parents on their behalf—

to invest in such preferences in much the same way that they invest in knowledge and skills. If such investments take place through primary socialization, other-regarding preferences may be perpetuated and possibly even strengthened in market-integrated societies. This can be reconciled with Bowles's earlier work if we view labor relations as a special type of market exchange in the sense that they are highly personalized.

In the light of the preceding description, we should now return to societies characterized by personalized rather than market exchange and think about whether they offer more or fewer incentives for youngsters—or parents on their behalf—to invest in other-regarding preferences. If there are more such incentives in a society, we would not expect to see a positive correlation between other-regarding preferences and market integration. Here the natural environment may have a determining role. Drawing on the extensive anthropological literature relating to this issue, Jean-Philippe Platteau (2000) proposed that a reliance on nature in a region that is subject to violent climatic shocks weakens the perceived relationship between individual effort and prosperity. Food and shelter appear as gifts from nature to the collective, and individuals who “receive” an abundance of either are viewed as lucky rather than as deserving, and they are expected to share as a result.[1] The natural environment may also determine the degree to which any technology required by those who rely directly upon it for their livelihood involves interpersonal cooperation. This idea gained support from the first phase of the Roots of Human Sociality project, in which the whalers of Indonesia were found to be highly other-regarding despite having very little engagement in market exchange, whereas the Machugenga, who, until recently, hunted and gathered in small family groups, were found to be the most individualistic.

After describing the urban environment in which the subjects of this study currently live, I compare the socioeconomic characteristics of the rural-born subjects with the results of the 1991–1992 Ghana Living Standards Survey to gain some insights into the context in which they were born and raised. This allows me to make some tentative predictions about the behavior of the rural-born relative to the urban-born subjects in this study, assuming no secondary socialization of the former.

THE SUBJECT POOL

People are drawn to Accra, the capital city of Ghana, from all over the country. They come in search of jobs and other income-earning opportunities. As a consequence of this continuing migration, the population of Accra is very ethnically diverse. The land on which the capital is built traditionally belongs to the Ga and Adangbe groups, but Accra is now also home to people from the various Akan ethnic groups, to Ewe, to Hausa-speaking people originally from Nigeria, and to members of the many indigenous northern Ghanaian groups. In accordance with Max Gluckman's (1961) predictions, the impact of this ethnic diversity on how people live their lives has dwindled over time. With the exception of some of the traditions relating to funerals, very few ethnic-specific behavioral rules and rites are observed. Even the previously striking distinction in inheritance rules between the Akan and the other groups is blurring as the Akan increasingly adhere to bilateral, as opposed to their traditional matrilateral, property transfer rules. However, while group differences in customs and practices become less marked, ethnicity remains an important component of individual identity, and this affects individuals' experiences in the urban labor market. So, for example, entrepreneurs strongly favor members of their own ethnic group when choosing who to employ and how much to pay (Barr and Oduro 2002). One possible explanation for these findings is that members of different ethnic groups adhere to different behavioral rules in interactive situations and interethnic cooperation is relatively difficult as a result.

The top panel of table 17.1 shows the ethnic composition of the sample of manufacturing employees involved in this study. Over half of the sample were Akan, with the Fante and Asante being the most frequently represented Akan subgroups. Just under 20 percent were Ewe, 15 percent were either Ga or Adangbe, and most of the remainder were from the north of the country. If ethnic differences in behavior exist, they could compromise our ability to identify a behavioral variation between the urban- and rural-born individuals in the Ghanaian sample. Thus, the impact of ethnicity on behavior needs to be investigated.

TABLE 17.1 *Socioeconomic Characteristics of the Ghanaian Manufacturing Employees*

	Full Sample	Player 1s, DG and UG	Player 2s, DG and UG	Player 1s, TPG	Player 3s, TPG	Rural-Born: All Roles	Urban-Born: All Roles
	177	30	30	39	39	53	85
Ethnic composition							
Asante	9.60%	10.00%	6.67%	7.69%	15.38%	18.38%	29.30%
Fante	18.08%	3.33%	16.67%	30.77%	15.38%	23.93%	19.38%
Other Akan (including Guan)	25.99%	33.33%	43.33%	20.51%	10.26%	25.21%	14.54%
Ga-Adangbe	15.25%	20.00%	6.67%	7.69%	17.95%	5.98%	18.06%
Ewe	19.77%	30.00%	26.67%	17.95%	25.64%	22.22%	10.13%
Northern	10.73%	3.33%	0.00%	15.38%	15.38%	3.85%	8.37%
Non-Ghanaian	0.56%	0.00%	0.00%	0.00%	0.00%	0.43%	0.22%
Religious composition							
Protestant	46.33%	50.00%	76.67%	30.77%	33.33%	41.45%	38.99%
Catholic	10.17%	10.00%	0.00%	15.38%	10.26%	14.53%	10.57%
Other Christian	29.94%	36.67%	23.33%	33.33%	35.90%	33.76%	39.43%
Muslim	9.60%	0.00%	0.00%	17.95%	12.82%	3.85%	8.59%
None	3.95%	3.33%	0.00%	2.56%	7.69%	6.41%	2.42%
Other personal characteristics							
Female (dummy)	31.07%	30.00%	46.67%	20.51%	35.90%	26.42%	36.47%
Urban-born (dummy)	63.28%	53.33%	50.00%	64.10%	74.36%	0.00%	100.00%
Accra-born (dummy)	41.24%	23.33%	16.67%	56.41%	51.28%	0.00%	63.53%
Age (in years)	35.50	30.87	34.37	34.82	36.95	36.21	33.38
Education (in years)	10.56	10.43	10.03	10.41	11.05	9.94	10.87
Number of children	1.95	1.53	1.77	1.69	1.92	2.00	1.58
Number of siblings	5.59	5.53	5.10	5.59	6.03	5.94	5.38
Years in current job	7.76	5.29	3.56	9.21	8.49	8.46	5.97
Annual income (in U.S. dollars)	722.10	1,096.10	636.24	653.30	659.12	675.98	792.09
Religious attendance (monthly)	15.77	7.93	7.47	16.69	16.36	7.28	16.06
Standard deviations of continuous variables							
Age in years	11.30	9.13	9.64	10.85	12.13	10.35	10.90
Education in years	3.87	2.97	2.44	3.88	3.78	2.29	3.87
Number of children	2.03	1.72	1.55	2.02	1.97	1.80	1.84
Number of siblings	2.47	2.10	2.86	2.46	2.48	2.76	2.28
Years in current job	8.33	5.75	4.25	9.21	7.89	7.85	7.22
Annual income (in U.S. dollars)	737.77	1,337.71	576.88	582.56	450.85	709.75	846.55
Religious attendance (monthly)	31.27	5.73	4.03	27.11	33.51	6.20	28.90

Source: Author's compilation based on author data.

Accra-dwelling people are also religiously diverse. As table 17.1 shows, 46 percent of the individuals included in this study attended non-evangelical Protestant churches, 10 percent were Catholic, 30 percent attended evangelical Protestant churches, 10 percent were Muslim, and only 4 percent stated that they had no religion. The individuals in the sample are also very religiously active; 93 percent of the employees who took part in the study stated that they were involved in at least one act of worship a month, and over 55 percent stated that they were involved in two or more acts of worship a week. Churches and mosques also provided the settings for much of the civil-social activity in which these urban dwellers were involved. Religion was thus an important part of these urban Ghanaians' social lives and identity and may have had some bearing on their other-regarding

preferences. Thus, it is important that we take religious affiliations and degrees of involvement into account during the analysis.

Ethnicity, religion, and family life aside, the factor that has the most influence on Accra-dwelling employees' life experience is their place of work. The structure of the Ghanaian manufacturing sector is similar to that of manufacturing sectors all over the developing world. A few large corporations, most of which are involved in the processing of Ghana's primary-product exports, exist alongside a multitude of small and micro enterprises producing generally low-quality goods for local markets. As Mans Söderbom, Francis Teal, and Anthony Wambugu (2005) have shown, where an employee is placed within this sector has a dramatic effect on his or her earnings. Those working in the large corporations can earn several times more than those working in the informal periphery.

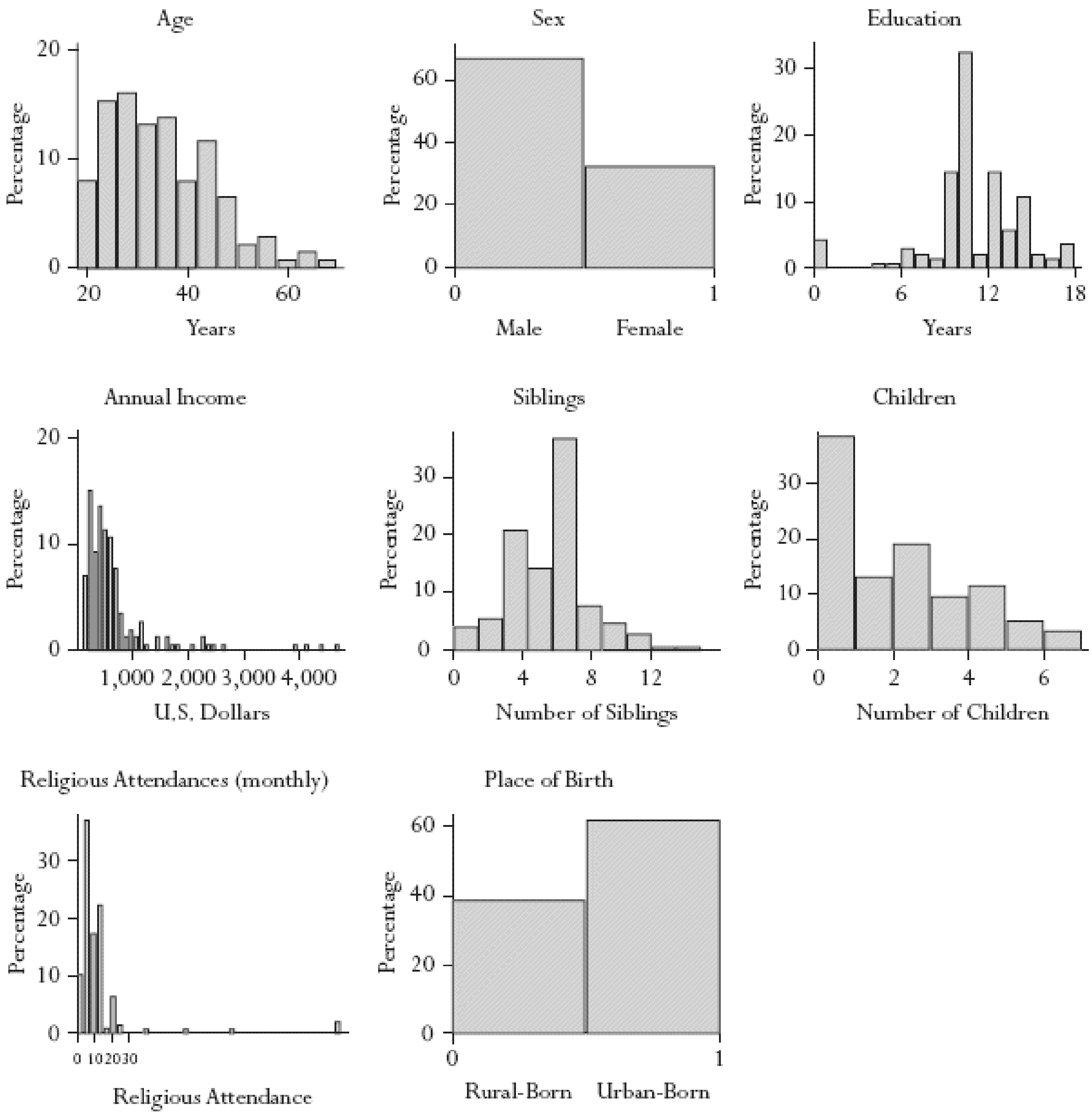
The employees included in this study were drawn from small enterprises ranging in size from seventeen to eighty-nine employees. They were predominantly production workers, although a few apprentices and office personnel also found their way into the sample. The annual earnings of these employees varied between $110 and $4,730, with a mean of around $720, or just over $2 a day. The distribution of earnings and several other characteristics are presented for the full sample in figure 17.1. Sixty-eight percent of the sample derived all of their income from one job in the manufacturing sector. However, 15 percent had second jobs, 4 percent engaged in petty trade, 1 percent earned some rental income, and 13 percent received "pocket money" from relatives.

Among these employees, significant material asset holdings were rare. Only 15 percent owned or had legal rights to land, and only 5 percent owned a house. The one asset in which they were relatively well endowed was human capital, which had a significant impact on their earnings. Thirty-seven percent of the employees had ten or more years of education, while only 4 percent had no education at all.

The last two columns in table 17.1 present the descriptive statistics for the rural-born and urban-born subjects separately. There were significant differences between the two groups. The rural-born were older (*t*-statistic significant at the 1 percent level), they were less educated (*t*-statistic significant at the 10 percent level), they had more children (*t*-statistic significant at the 1 percent level), they had been with their current employer longer (*t*-statistic significant at the 1 percent level), they earned less (*t*-

statistic significant at the 10 percent level), and they attended religious services less often (*t*-statistic significant at the 1 percent level). In addition, the proportion of females within the rural-born sample was lower (*t*-statistic significant at the 5 percent level), they were more likely to be Fante, from other Akan groups, or Ewe, and they were more likely to be Protestant or Catholic and less likely to be Muslim. Given these differences, it is critical that we control for these socioeconomic characteristics when endeavouring to identify the effect of birthplace on behavior.

FIGURE 17.1 *Distribution of Age, Sex, Education, Income, Siblings, Children, Time in Current Workforce, and Place of Birth for Full Accra Sample*



Source: Author's compilation based on author data.

A comparison of these data from figure 17.1 and table 17.1 with data from the 1991–1992 and 1998–1999 Ghana Living Standards Survey conducted by the Ghana Statistical Service (2000) indicates that the subjects of this study were well educated by Ghanaian standards. The comparison is especially striking if we restrict it to rural areas: in 1991–1992, fewer than

45 percent of rural-dwelling children of the appropriate age were enrolled in secondary education, whereas over 90 percent of the rural-born subjects in this study had some secondary education. Since investment in education is usually correlated with household income, we may also infer from this comparison that the rural-born subjects were from rural households with relatively high incomes. Rural incomes in Ghana are primarily derived from cash-crop farming (mainly cocoa) and petty trading. The household is the unit of production in such livelihoods and rural labor markets are very thin. In addition, using ethnicity as an indicator of geographical origin, we see that the rural-born subjects in this study generally came from forested areas, which are less inclined to suffer climatic shocks compared to most of sub-Saharan Africa. Thus, while we should assume a certain amount of market integration in the context where the rural-born subjects were born and raised, there is little reason to assume high levels of inter-household cooperation. Further, given the thinness of rural labor markets, there is no reason to expect rural-dwelling parents to know which behavioral characteristics are likely to be rewarded in such markets. Thus, while we have very little information with which to address this issue, the information we do have suggests that the context in which the rural-born subjects in this study were born and raised is likely to be associated with less other-regarding preferences than the urban context in which all the subjects now lived and worked.

METHODOLOGICAL APPROACH

The behavioral experiments that generated the data for this study were conducted in the second quarter of 2002. They involved 177 manufacturing employees drawn from thirteen manufacturing enterprises situated in Accra. Thirty pairs of employees played a dictator game followed by an ultimatum game, and thirty-nine triads of employees played the third-party punishment game. The games were played in accordance with the protocols set out in chapter 3 of this volume. The experimental sessions were conducted either on weekday evenings or on Saturday afternoons after work. Three DG and UG sessions were held—two in rooms provided by the manufacturing enterprises and one in a nearby school. Each of these sessions involved employees from only one place of work. Five TPG sessions were held, all in schools near the employees' places of work. Each of these sessions involved

employees from two places of work. Not all play was between colleagues, and the subjects knew this to be the case.[2] This last point needs to be borne in mind when comparing distributions of offers across games.

One pilot session was conducted in order to establish that the strategy method was not hindering the subjects' understanding of the game. During free-form, postplay interviews with each of the players who took part in the pilot session, no major problems of understanding were identified. Once the pilot session was complete, the scripts were adhered to in every session, and when subjects had questions, care was taken to answer by repeating the relevant part of the script.

Every session was conducted in the same way. Once the subjects were assembled, they were taught the first game and given some examples by a Twi-speaking research assistant standing at the front of the room. No talking between subjects was allowed and no questions were taken. Then the subjects were called one at a time to meet with the Twi-speaking research assistant. During this meeting, the research assistant would go over the game again, work through some more examples, answer questions, test the subjects' understanding, and then play. Afterward, the subject would be asked to wait in an area separated from those who had not yet played. If only one game was being played, once everyone had finished their one-to-one meetings, the subjects were paid and dismissed. If two games were being played, care was taken to ensure that the subjects did not discuss the first game while waiting for the second. Once everyone had played the first game, the subjects were taught the second. They met with a research assistant a second time, were asked to wait in a separate area after they played the game until everyone else had played as well, and then were finally dismissed after being paid for both games at the same time.

In the DG and UG sessions, all of the one-to-one interviews were conducted by a single research assistant with the researcher at his side. In the TPG sessions, however, this arrangement was not possible owing to time constraints. Instead, four Twi-speaking research assistants worked in parallel conducting the one-to-one interviews while the researcher oversaw the proceedings from a centrally located desk. Statistical tests suggest that there was no systematic variation in behavior depending on which research assistant interviewed a subject. Thus, it is reasonable to assume that this departure from the ideal protocol did not affect the resulting data.

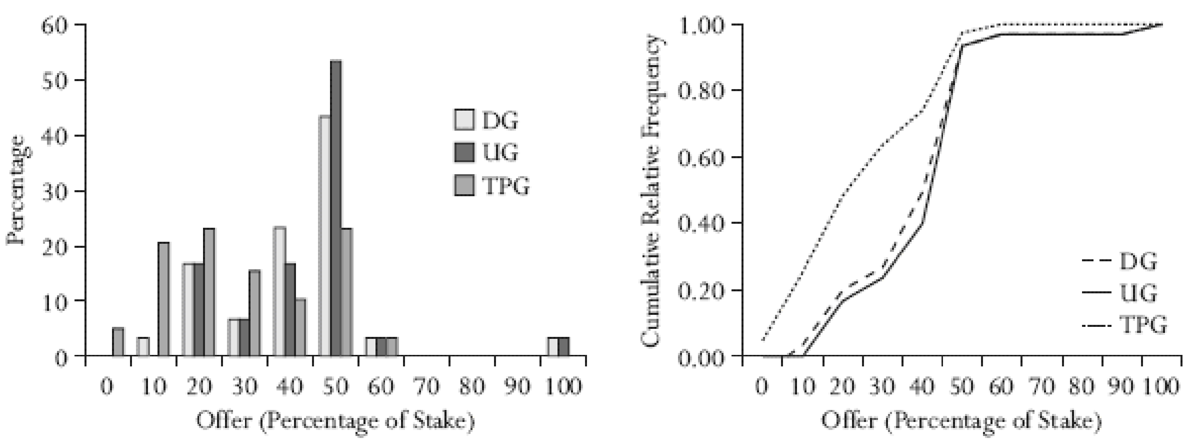
In each game the initial stake given to player 1 to be divided between him- or herself and player 2 was Cedi50,000, which was roughly equivalent to U.S.$6.50 at the exchange rate prevailing at the time. This amount was approximately equivalent to twice the average daily wage of the subjects, although for those earning one standard deviation more than the average, it was equivalent to only one day's wage. Player 3 in the third-party punishment game was provided with an initial stake of Cedi25,000 (U.S.$3.25) and could reduce player 1's final payoff by Cedi15,000 at a cost of Cedi5,000 to him- or herself. Every player also received a fee of Cedi10,000 (U.S.$1.30) for showing up to the experimental session.

The analysis of the resulting data aims to explain the variation in six variables, the offers made in each of the three games, the minimum and maximum acceptable offers in the ultimatum game, which are derived from player 2s' rejection strategies, and the minimum unpunished offer in the third-party punishment game, which is derived from player 3s' fining strategies. I begin with a simple graphical analysis in which I explore whether the employees' behavior conformed to the canonical assumptions about selfish money-maximization. Then I conduct a graphical comparison of the behavior of the urban- and rural-born individuals in the sample. Finally, I complement this graphical analysis with a series of statistical tests and simple regressions that take account of several socioeconomic variations across the employees.

The regression analyses were severely constrained by the small numbers of observations. To minimize the effects of this constraint I adopted the following approach. First, I investigated the extent to which variations in each of the six behavioral variables can be explained by the diversity of the sample with respect to ethnicity, religion, and place of work. Second, I regressed each of the six behavioral variables on nine control variables and a dummy variable taking the value one if the player was urban-born and zero otherwise. The control variables include: the age of the player in years; a dummy variable taking the value one if the player was female; the player's level of education in years; the player's annual income expressed in U.S. dollars; the number of siblings the player reported having, included to capture an important aspect of the environment in which the player was socialized; the number of children the player had, included to capture both marital status and the extent to which the player might have been actively investing in the socialization of other human beings; the number of times a

month the player engaged in a religious act of worship; and the length of time (in years) the player had been in his or her current job, included to capture the effect of length of acquaintance on altruism between colleagues.[3] Third, because these regressions may be overidentified and suffer from multicolinearity given the small number of observations, I then eliminated all the variables that were insignificant in the most general regression one at a time to check the robustness of the key results. To aid cross-site comparisons I also ran one regression for each behavioral variable that took only socioeconomic variables collected across all the sites discussed in this volume as explanatory variables.[4]

FIGURE 17.2 *Offers in the Dictator, Ultimatum, and Third-Party Punishment Games*



Source: Author's compilation based on author data.

RESULTS

Are Accra-Dwelling Manufacturing Employees Selfish Money-Maximizers?

Under the standard canonical assumptions about selfish money-maximization, theory predicts that player 1s in the dictator game would give nothing to player 2s; that in the ultimatum game player 2s would be indifferent between accepting and rejecting zero offers but would accept all nonzero offers, and so player 1s would make the lowest possible nonzero

offer; and that in the third-party punishment game player 3s would never punish and player 1s would give nothing to player 2s.

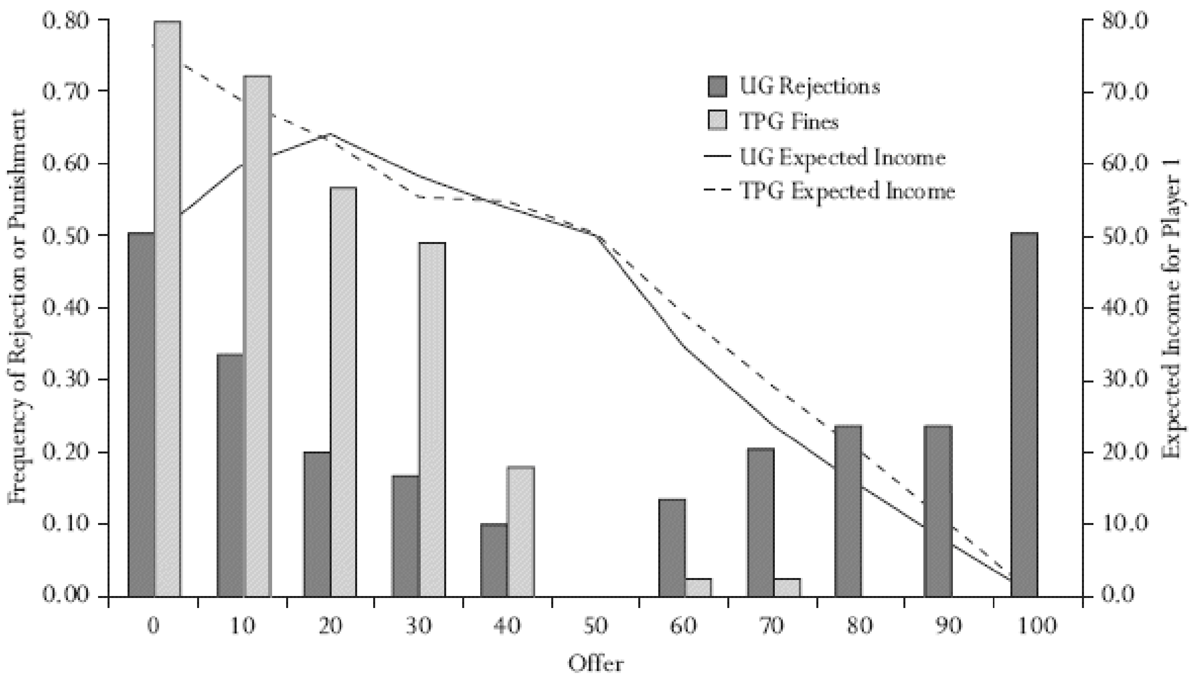
Figure 17.2 contains histograms and cumulative distribution functions for the offers (expressed as a percentage of the initial stake) made by the Ghanaian player 1s in the DG, UG, and TPG. These graphs provide no support for the standard canonical assumptions about selfish money-maximization. None of the thirty player 1s in the dictator game made zero offers, none of the thirty player 1s in the ultimatum game made minimum possible positive offers, and only two out of the thirty-nine player 1s in the third-party punishment game made zero offers. The distributions of offers made in the DG and UG were very similar, and there was a high degree of correlation between the two (the pairwise correlation coefficient was 0.82). Indeed, twenty-three out of the thirty players who played both games made the same offer in each game. In both distributions, there is a strong modal offer at 50 percent of the stake, with a considerable proportion of players (50 and 40 percent in the DG and UG, respectively) making a variety of lower offers. The mean offers in the DG and UG are statistically indistinguishable at 42 and 44 percent of the original stake, respectively.

The distribution of offers in the third-party punishment game is markedly different. Rather than a strong mode at 50 percent and a tail to the left, we see a fairly uniform distribution of offers ranging from 0 to 50 percent and a mean offer of 28.5 percent. This mean is significantly (1 percent level) lower than the means for both the DG and UG according to both simple *t*-tests and regressions designed to take account of any variations in socioeconomic characteristics between the individuals playing the different games.

Figure 17.3 summarizes the behavior of player 2s in the ultimatum game and player 3s in the third-party punishment game. The mean rejection strategies chosen by player 2s in the UG are represented by the darker columns. The fining strategies chosen by player 3s in the TPG are represented by the lighter columns. These are superimposed by lines showing the expected income levels implied by the rejection rates for each offer level in the UG (dark line) and fining for each offer level in the TPG (dashed line). Once again, we see little support for the canonical assumptions. Only nine out of the thirty responding players in the UG and no players at all in the TPG behaved in accordance with these assumptions. That the expected income maximizing offer in the TPG was zero compared

to 30 percent of the initial stake in the UG partly explains the difference in the distribution of offers between the two games.

FIGURE 17.3 *Expected Income in the Ultimatum and Third-Party Punishment Games*



Source: Author's compilation based on author data.

The most striking feature of figure 17.3 is the U-shape of the rejection function relating to the ultimatum game. Not only low but also high offers were rejected by player 2s in urban Ghana. Such rejection functions have been observed elsewhere. In the first phase of this research project, David Tracer (2003, 2004) observed some of his sample of the Au and Gnau of Papua New Guinea making high offers and those offers being rejected. Those rejections were consistent with a U-shaped rejection function, and when Tracer returned with his co-authors to conduct the strategy method UG with the Au in the second phase, he did indeed find such a function (see chapter 7, this volume, available at: http://www.russellsage.org/Ensminger). Juan-Camilo Cardenas found a similarly pronounced U-shape in the rejection functions chosen by the Sanquianga of Colombia (chapter 16, this volume, available at: http://www.russellsage.org/Ensminger). Joe and Natalie Henrich, working with the Yasawa (chapter 9, this volume, available at: http://www.russellsage.org/Ensminger), Carolyn Lesorogol working with

the Samburu (chapter 14, this volume, available at: http://www.russellsage.org/Ensminger), and Alex Bolyanatz working with the Sursurunga (chapter 11, this volume, available at: http://www.russellsage.org/Ensminger) also report U-shaped rejection functions, although in these sites rejections of high offers were rarer.

TABLE 17.2 *Means of Behavioral Variables for Urban-Born and Rural-Born Employees*

	Urban-Born		Rural-Born		Full Sample	
	Mean	N	Mean	N	Mean	N
Offers						
Dictator game	45.00	16	38.57	14	42.00	30
Ultimatum game[a]	50.00	16	37.14	14	44.00	30
Third-party punishment game	29.20	25	27.14	14	28.46	39
Response strategies						
Minimum acceptable offer (UG)	9.33	15	16.67	15	13.00	30
Maximum acceptable offer (UG)	87.33	15	86.00	15	86.67	30
Minimum unpunished offer (TPG)	36.90	29	38.00	10	37.18	39

Source: Author's compilation based on author data.

[a]Distributions of offers for urban-born and rural-born individuals significantly different at the 5 percent level according to a two-sample Wilcoxon rank-sum (Mann-Whitney) test. The difference in mean offers for urban-born and rural-born individuals was significant at the 5 percent level according to a T-test, equal standard errors not assumed.

We do not observe the same U-shape in the fining function, and interestingly, neither do any of the authors just cited. Accra-dwelling player 3s were highly likely to fine low offers, but offers of 50 percent and above rarely attracted fines. Only one player fined offers in this range. He chose to fine in the case of an offer of 100 percent. This action would have left him poorer without affecting player 1, who had allocated him- or herself zero already. This is consistent with a strong aversion to advantageous inequality.

Comparing Urban- and Rural-Born Employees' Behavior

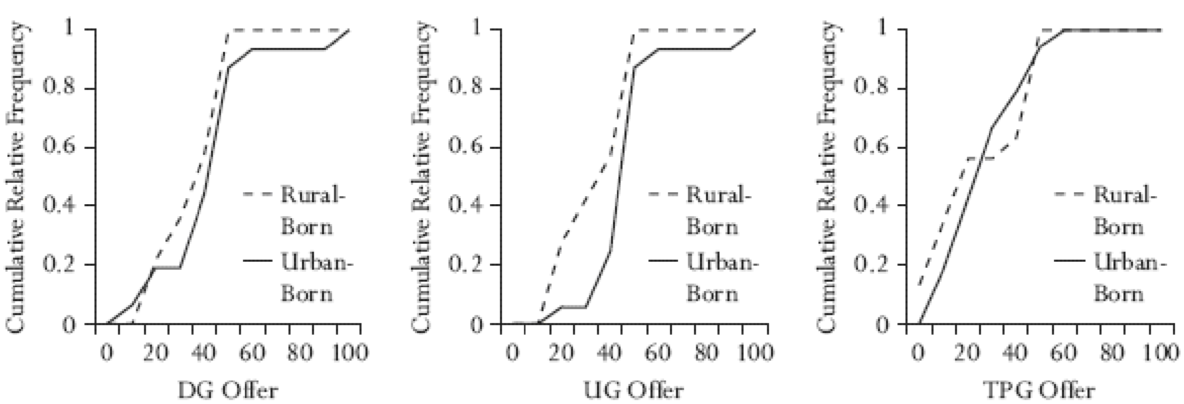
Having established that Accra-based manufacturing employees tend to have other regarding preferences, I now turn to a comparison of preferences across urban-born and rural-urban employees.

In the dictator and ultimatum games, sixteen urban-born and fourteen rural-born employees made offers, while in the third-party punishment game twenty-five urban-born and fourteen rural-born employees made offers. The means presented in table 17.2 suggest that the urban-born employees made

higher offers in all three games. However, the cumulative distribution functions presented in figure 17.4 indicate that the distributions in offers made by the two types of employee are only clearly distinct in the case of the ultimatum game. This is borne out by two-sample Wilcoxon rank-sum (Mann-Whitney) tests, which indicate that the offer distributions for rural- and urban-born players are only significantly different in the UG, and by *t*-tests that indicate that the corresponding mean offers are only significantly different (5 percent level) in the UG.

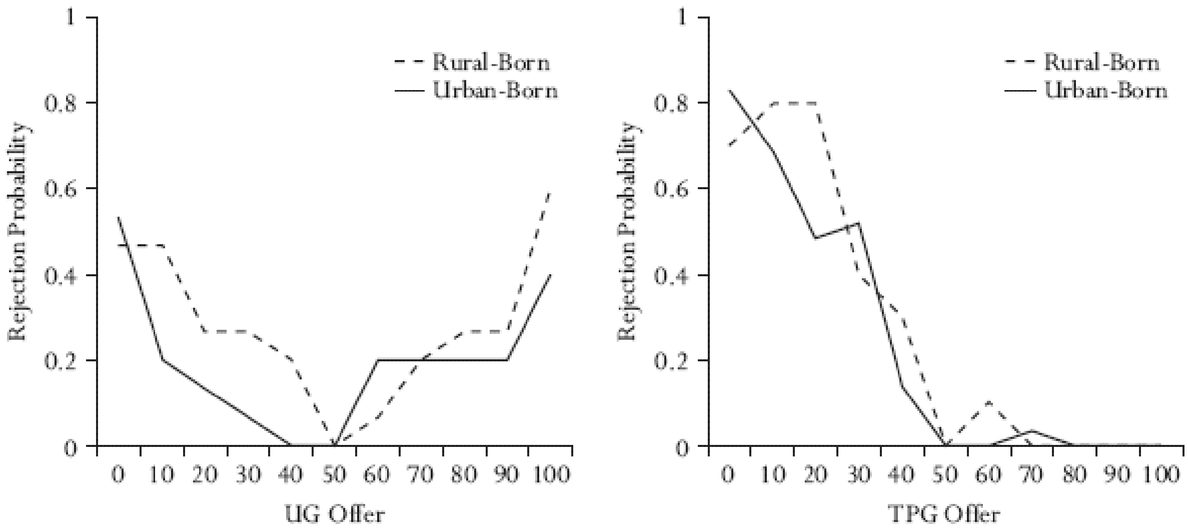
Response strategies relating to the ultimatum game were elicited from fifteen urban-born and fifteen rural-born employees. The rejection functions plotted in figure 17.5 and the mean minimum acceptable offers (MinAOs) presented in table 17.2 suggest that the urban-born employees were less inclined than their rural-born colleagues to reject low offers. However, neither the distributions of MinAOs nor the mean MinAOs are significantly different according to a two-sample Wilcoxon rank-sum (Mann-Whitney) test and a *t*-test, respectively. The mean maximum acceptable offers (MaxAOs) presented in table 17.2 suggest that the urban-born employees were also less inclined to reject high offers, although in this case the graphs are indistinct and both the two-sample Wilcoxon rank-sum (Mann-Whitney) test and the *t*-test yield insignificant results. Finally, while the mean minimum unpunished offer (MUO) for urban-born individuals is lower than that for rural-born individuals, the graph, the two-sample Wilcoxon rank-sum (Mann-Whitney) test, and the *t*-test indicate no significant difference between the distributions.

FIGURE 17.4 *Offers Made by Urban-Born Employees and by Rural-Born Migrant Employees*



Source: Author's compilation based on author data.

FIGURE 17.5 *Rejection and Fining Functions for Urban-Born and Rural-Born Employees*



Source: Author's compilation based on author data.

Regression Analyses

The first set of regressions took each of the behavioral variables and regressed them on a set of ethnic dummy variables, then on a set of religion dummy variables, and finally on a set of workplace dummy variables. Table 17.3 contains the levels of significance (*p*-values) and adjusted R-squareds for each of the resulting eighteen regressions. None of the regressions are significant at the 10 percent level, and the adjusted R-squareds are either small or negative. This indicates that ethnicity, religion, and workplace explain little or none of the variation in behavior across the Ghanaian sample. This being the case, we need not use valuable degrees of freedom controlling for any of these factors during subsequent regression analyses.

TABLE 17.3 *Explanatory Power of Ethnic, Religion, and Employer Dummies (p-Values)*

	Ethnicity			Religion			Enterprise		
	Groups	*p*-Value	Adjusted R-squared	Groups	*p*-Value	Adjusted R-squared	Groups	*p*-Value	Adjusted R-squared
Offers									
Dictator game	6	0.9190	−0.1415	4	0.2886	0.0322	3	0.6500	−0.0403
Ultimatum game	6	0.6251	−0.0535	4	0.3083	0.0263	3	0.2471	0.0316
Third-party punishment game	6	0.3251	0.0272	4	0.5897	−0.0313	10	0.3610	0.0346
Response strategies									
Minimum acceptable offer (UG)	5	0.3604	0.0190	2	0.8263	−0.0339	3	0.1188	0.0827
Maximum acceptable offer (UG)	5	0.7613	−0.0798	2	0.5901	−0.0248	2	0.7686	−0.0533
Minimum unpunished offer (TPG)	6	0.1061	0.1152	6	0.2449	0.0517	10	0.3671	0.0365

Source: Author's compilation based on author data.

In tables 17.4 to 17.9, each of the behavioral variables is regressed on various sets of socioeconomic characteristics. In each case, the reported coefficients on the continuous variables have been standardized; they show the increase in offer, expressed in percentage points of the initial stake, associated with a one-standard-deviation increase in the independent variable. The results of several tests relating to the normality and independence of the error terms are presented in the notes of each table.[5]

Table 17.4 presents the set of regressions that take offers in the dictator game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables. These variables were collected in all sites. Only income is significant. Individuals with higher incomes made more generous offers. Model 2, the most general model in the table, indicates that income, number of siblings and children, and frequency of religious attendance have positive and significant effects on offers made in the dictator game. These four variables remain significant following the removal of the insignificant variables from the model. Model 7, the most parsimonious model, contains only these four variables and explains over 50 percent of the variation in offers. According to this model, a one-standard-deviation increase in income is associated with an 8.0-percentage-point increase in offer size, a one-standard-deviation increase in number of siblings is associated with a 6.3-percentage-point increase in offer size, a one-standard-deviation increase in number of children is associated with a 5.8-percentage-point increase in offer size, and a one-standard-deviation increase in religious attendance is associated with a 7.6-percentage-point increase in offer size. Note that the urban-born dummy variable is insignificant throughout.

Table 17.5 presents the set of regressions that take offers in the ultimatum game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables. Once again, income has a positive and significant effect on offer size. The most general model, model 2, indicates that income and number of siblings and children have positive and significant effects on offers, age has a negative and significant effect, and urban-born employees offer more than rural-born ones. However, not all of these five variables remain significant once we start dropping the insignificant ones. In the model that contains only these five variables, model 6, the number of siblings is insignificant, and dropping this variable from the model renders the subject's age insignificant (model 7). Thus, the final, most parsimonious model, model 8, contains only income, number of children, and the urban-born dummy variable. This model explains just over 40 percent of the variation in offers. According to this model, a one-standard-deviation increase in income is associated with a 6.0-percentage-point increase in offer size, a one-standard-deviation increase in number of children is associated with a 5.2-percentage-point increase in offer size, and being urban- rather than rural-born is associated with a 14.8-percentage-point increase in offer size.

Table 17.6 presents the set of regressions that take offers in the third-party punishment game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables; none of these are significant. The most general model, model 2, indicates that income and number of siblings have positive and significant effects on offers. These two variables remain significant following the removal of the insignificant variables from the model. Model 9, the most parsimonious model, contains only these two variables and explains just over 20 percent of the variation in offers. According to this model, a one-standard-deviation increase in income is associated with a 5.7-percentage-point increase in offer size, and a one-standard-deviation increase in number of siblings is associated with a 6.9-percentage-point increase in offer size. The urban-born dummy variable is insignificant throughout.

TABLE 17.4 *Explaining Variations in Offers in the Dictator Game*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Age	1.9572	−8.9847					
	(3.1184)	(6.2801)					
Female (dummy)	−0.5244	−6.3600	−5.5588				
	(7.1659)	(6.3073)	(6.4371)				
Education	−3.1428	−1.4341	−3.3898	−4.3071			
	(3.4715)	(3.4678)	(3.2655)	(3.0700)			
Income	7.6701	8.6217	7.8191	8.5398	8.3498	7.5019	8.0104
	(3.0268)*	(2.8325)**	(2.8447)*	(2.7038)**	(2.7566)**	(2.4034)**	(2.3809)**
Siblings		8.5503	6.6871	6.4300	6.2433	6.5638	6.3404
		(2.7684)**	(2.5031)*	(2.4710)*	(2.5188)*	(2.4410)*	(2.4512)*
Children		16.1526	7.4449	6.7372	8.0827	6.5345	5.7616
		(7.0534)*	(3.6523)	(3.5385)^	(3.4771)*	(2.5157)*	(2.4449)*
Religious attendance		6.0187	5.4242	5.9946	6.8493	6.7460	7.6347
		(2.7472)*	(2.7825)	(2.6873)*	(2.6718)*	(2.6351)*	(2.5414)**
Tenure in workforce		−4.2612	−4.2725	−3.7990	−2.5435		
		(3.8797)	(3.9752)	(3.9144)	(3.8901)		
Urban-born (dummy)		6.4578	8.2665	6.6617	4.5259	6.0756	
		(6.1580)	(6.1752)	(5.8548)	(5.7712)	(5.1988)	
Constant	40.3032	27.4206	16.8910	18.7989	1.9026	0.1110	2.9841
	(18.1426)*	(16.9859)	(15.6855)	(15.4391)	(9.8617)	(9.3597)	(9.0969)
Observations	30	30	30	30	30	30	30
R-squared	0.28	0.64	0.6	0.59	0.55	0.54	0.52
Adjusted R-squared	0.16	0.48	0.45	0.46	0.43	0.45	0.44

Source: Author's compilation based on author data.

Notes: Standard errors are in parentheses. The estimated coefficients in column 7 are not affected by dropping outliers, which increases the size and significance of the coefficients. The residuals relating to the regression in column 7 are normally distributed (skewness/kurtosis tests for normality) and free from heteroscedasticity (Cook and Weisberg test).

^significant at 10 percent level; *significant at 5 percent level; **significant at 1 percent level

TABLE 17.5 *Explaining Variations in Offers in the Ultimatum Game*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	−0.9667	−13.3315	−12.7763	−14.3084	−13.5415	−13.0381	−8.7697	
	(3.0657)	(5.9164)*	(5.9094)*	(5.3769)*	(5.6233)*	(5.6691)*	(5.1850)	
Female (dummy)	2.4172	−6.2800						
	(7.0449)	(5.9420)						
Education	−3.1893	−0.9142	−2.0632					
	(3.4129)	(3.2670)	(3.0894)					
Income	7.2896	8.3859	9.1441	9.2214	8.4346	6.9080	7.0217	5.9673
	(2.9757)*	(2.6684)**	(2.5773)**	(2.5421)**	(2.6279)**	(2.3433)**	(2.4178)**	(2.4182)*
Siblings		4.8507	4.4475	4.6829	3.7082	4.2074		
		(2.6081)^	(2.5872)^	(2.5306)^	(2.5946)	(2.5905)		
Children		20.4408	19.1095	21.1244	19.5000	16.3475	12.7520	5.1857
		(6.6450)**	(6.5426)**	(5.7319)**	(5.9397)**	(5.4196)**	(5.1063)*	(2.5487)^
Religious attendance		3.3088	3.9114	4.3745				
		(2.5881)	(2.5315)	(2.4038)^				
Tenure in workforce		−5.9863	−5.4563	−4.9319	−4.5189			
		(3.6550)	(3.6305)	(3.4997)	(3.6636)			
Urban-born (dummy)		11.7007	10.0137	8.7969	11.5888	14.2763	13.5718	14.8279
		(5.8013)	(5.5929)	(5.2208)	(5.2351)*	(4.8116)**	(4.9465)*	(5.0624)**
Constant	51.7847	50.9407	52.4286	47.3972	53.6600	49.1163	49.2784	26.5706
	(17.8363)**	(16.0022)**	(15.9845)**	(13.9190)**	(14.1484)**	(13.8080)**	(14.2527)**	(4.9525)**
Observations	30	30	30	30	30	30	30	30
R-squared	0.21	0.64	0.62	0.61	0.55	0.52	0.47	0.41
Adjusted R-squared	0.09	0.48	0.47	0.49	0.43	0.42	0.38	0.34

Source: Author's compilation based on author data.

Notes: Standard errors are in parentheses. The estimated coefficients in column 8 are not affected by dropping outliers, which increases the size and significance of the coefficients. The residuals relating to the regression in column 8 are normally distributed (skewness/kurtosis tests for normality) and free from heteroscedasticity (Cook and Weisberg test).

^significant at 10 percent level; *significant at 5 percent level; **significant at 1 percent level

TABLE 17.6 *Explaining Variations in Offers in the Third-Party Punishment Game*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Age	−0.3359	0.6828							
	(2.7940)	(6.1976)							
Female (dummy)	−7.8824	−5.6633	−5.8380						
	(8.1397)	(8.5065)	(8.2187)						
Education	−4.0360	−5.6584	−5.6194	−4.2358					
	(3.5803)	(4.4308)	(4.3433)	(3.8509)					
Income	4.9290	8.6749	8.6037	8.8096	6.3155	6.0759	5.8705	5.6558	5.7005
	(3.0543)	(3.7261)*	(3.6087)*	(3.5682)*	(2.7641)*	(2.6244)*	(2.5874)*	(2.5688)*	(2.5325)*
Siblings		6.8179	6.9385	7.1431	7.4454	7.5253	7.7804	6.9089	6.9060
		(3.1345)*	(2.8884)*	(2.8510)*	(2.8470)*	(2.7972)*	(2.7514)**	(2.5648)*	(2.5325)**
Children		−4.7615	−4.4312	−4.2097	−1.0464				
		(5.3796)	(4.3925)	(4.3463)	(3.2695)				
Religious attendance		0.8407	0.7633	1.2449	1.7861	1.8266			
		(2.9545)	(2.8222)	(2.7175)	(2.6814)	(2.6417)			
Tenure in workforce		4.1055	4.5347	4.3644	3.0265	2.4586	2.4274		
		(5.3050)	(3.5406)	(3.5042)	(3.2971)	(2.7408)	(2.7193)		
Urban-born (dummy)		2.3483	2.5501	1.3670	1.8625	1.6411	2.4567	1.6199	
		(6.2035)	(5.8285)	(5.5406)	(5.5404)	(5.4217)	(5.2511)	(5.1517)	
Constant	36.4638	15.2548	16.3949	11.2328	0.0014	−0.1058	0.1773	5.3638	6.3586
	(14.6535)*	(19.5102)	(16.2650)	(14.4345)	(10.2360)	(10.0904)	(10.0045)	(8.1206)	(7.3847)
Observations	39	39	39	39	39	39	39	39	39
R-squared	0.10	0.30	0.29	0.28	0.26	0.25	0.24	0.22	0.22
Adjusted R-squared	−0.01	0.08	0.11	0.12	0.12	0.14	0.15	0.16	0.18

Source: Author's compilation based on author data.
Notes: Standard errors are in parentheses. The estimated coefficients in column 9 are not affected by dropping outliers, which increases the size and significance of the coefficients. The residuals relating to the regression in column 9 are normally distributed (skewness/kurtosis tests for normality) and free from heteroscedasticity (Cook and Weisberg test).
*significant at 5 percent level; **significant at 1 percent level

Table 17.7 presents the set of regressions that take the minimum acceptable offers for player 2s in the ultimatum game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables, and none of these are significant. The most general model, model 2, suggests that only birthplace has a significant effect on rejection behavior: urban-born employees accept significantly lower offers than their rural-born counterparts. As insignificant variables are dropped from the model, tenure in the workforce gains significance: those who have been in their jobs longer accept lower offers. Further, when this variable is dropped from the model, the urban-born dummy becomes insignificant and we are left unable to explain any of the variation in rejection behavior (model 10). This being the case, while there are concerns about robustness, the model containing the urban-born dummy and tenure in the workforce (model 9) is preferred. These two variables explain just over 20 percent of the variation in minimum acceptable offers. According to this model, a one-standard-deviation increase in tenure is associated with a 7.7-percentage-point decline in the MinAO, while being urban- rather than rural-born is associated with a 16.7-percentage-point decline in the MinAO.

Table 17.8 presents two regressions that take the maximum acceptable offer for player 2s in the ultimatum game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables; model 2 is the most general model. None of the socioeconomic variables placed on the right-hand side of these regressions are significant.

Finally, table 17.9 presents the regressions that take the minimum unpunished offer in the third-party punishment game as the dependent variable. Model 1 includes only age, the female dummy variable, education, and income as explanatory variables, and none of these are significant. None of the explanatory variables in the most general model, model 2, are significant either. However, once we start dropping the least significant variables from the model, education becomes weakly significant (models 6 to 10). More-educated subjects are less tolerant of low offers. This result remains significant after all the insignificant variables are dropped from the model. This one variable explains 10 percent of the variation in MUO (model 9). According to this model, a one-standard-deviation increase in education is associated with a five-percentage-point increase in the MUO. The urban-born dummy variable is insignificant throughout.

DISCUSSION AND CONCLUSIONS

The results presented here indicate that Accra-based manufacturing employees are not selfish money-maximizers. The similarity in offers between the dictator and ultimatum games, combined with the strong modal offers at 50 percent despite the expected income-maximizing offer in the latter of only 30 percent, suggests that the ultimatum is of only minimal importance as a motivating force for player 1s in the ultimatum game. That this might indeed be the case was also suggested in interviews with key informants conducted a day or two after each experimental session. They indicated that the player 1s viewed both the dictator game and the ultimatum game as sharing problems in which they were weighing up their desire to keep the money for themselves, on the one hand, with their desire to be fair, on the other.

In contrast, player 1s in the third-party punishment game appeared far more focused on the financial implications of their own and others' decisions. In this case, key informants stated that, with no clear guidance as

to when the fine would and would not be levied, player 1s felt the need to hold money back to ensure that they would end up with a reasonable amount for themselves. This suggests that the existence of the sanctioning player 3 may have crowded out the other-regarding preferences of player 1s. Recall, however, that the TPG sessions involved employees from two workplaces, whereas the DG and UG sessions involved employees from only one workplace. Hence, the difference in offers may indicate that other-regarding preferences were stronger when employees knew they were playing with colleagues.

TABLE 17.7 *Explaining Variations in the Minimum Acceptable Offers in the Ultimatum Game*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age	1.0866	1.6112								
	(3.1831)	(6.7878)								
Female (dummy)	−12.7239	−10.8333	−11.4185							
	(6.4251)	(7.9163)	(7.3517)							
Education	2.9530	5.4591	5.8604	3.9094						
	(3.3769)	(4.3460)	(3.9128)	(3.8228)						
Income	−6.2055	−5.0680	−5.3175	−2.6338	−1.2382					
	(3.5396)	(3.9768)	(3.7482)	(3.4313)	(3.1514)					
Siblings		−1.2139	−0.9626	−3.8591	−4.9133	−4.9684				
		(3.9489)	(3.7180)	(3.3181)	(3.1571)	(3.0979)				
Children		−2.9463	−1.6503	−2.4544	−2.1657	−2.3840	−1.6413			
		(6.4686)	(3.3897)	(3.4558)	(3.4477)	(3.3421)	(3.4124)			
Religious attendance		1.9537	2.0733	0.8697	0.1945	0.1322	0.3766	−0.0876		
		(3.3481)	(3.2348)	(3.2399)	(3.1750)	(3.1147)	(3.2073)	(3.0131)		
Tenure in workforce		−5.1407	−5.0748	−5.6545	−5.4916	−5.6835	−7.1076	−7.6624	−7.6626	
		(3.6883)	(3.5943)	(3.6878)	(3.6880)	(3.5906)	(3.5868)^	(3.3457)*	(3.2832)*	
Urban-born (dummy)		−16.6946	−17.7216	−16.4104	−13.5235	−13.9538	−13.9035	−13.8824	−13.8826	−7.3333
		(8.4377)^	(7.0794)*	(7.2509)*	(6.6855)^	(6.4780)*	(6.6785)*	(6.5789)*	(6.4560)*	(6.2590)
Constant	9.7776	10.0438	12.9934	20.8680	36.6122	36.0856	27.0832	26.5222	26.3604	16.6667
	(17.0081)	(22.6994)	(18.5646)	(18.4232)	(10.1293)**	(9.8618)**	(8.3596)**	(8.1546)**	(5.8441)**	(4.4258)**
Observations	30	30	30	30	30	30	30	30	30	30
R-squared	0.18	0.40	0.40	0.33	0.29	0.29	0.21	0.21	0.21	0.05
Adjusted R-squared	0.05	0.13	0.17	0.11	0.11	0.14	0.09	0.13	0.15	0.01

Source: Author's compilation based on author data.

Notes: Standard errors are in parentheses. The estimated coefficients in column 9 are not affected by dropping outliers, which increases the size and significance of the coefficients. The residuals relating to the regression in column 9 are normally distributed (skewness/kurtosis tests for normality). A Cook and Weisberg test indicates that there is some heteroscedasticity. However, controlling for this by adjusting the errors ex post does not significantly affect the results.

^significant at 10 percent level; *significant at 5 percent level; **significant at 1 percent level

TABLE 17.8 *Explaining Variations in the Maximum Acceptable Offers in the Ultimatum Game*

	(1)	(2)
Age	−0.3175	6.6075
	(3.6335)	(8.4885)
Female (dummy)	7.6387	7.6341
	(7.3343)	(9.8997)
Education	0.0800	−0.7865
	(3.8547)	(5.4349)
Income	2.6288	2.5641
	(4.0405)	(4.9731)
Siblings		−0.1011
		(4.9383)
Children		−9.2074
		(8.0894)
Religious attendance		2.3937
		(4.1870)
Tenure in workforce		4.8429
		(4.6125)
Urban-born (dummy)		8.7187
		(10.5518)
Constant	81.0055	57.8093
	(19.4149)**	(28.3868)
Observations	30	30
R-squared	0.05	0.16
Adjusted R-squared	−0.10	−0.22

Source: Author's compilation based on author data.
Notes: Standard errors are in parentheses. No diagnostics were performed on residuals.
**significant at 1 percent level

The frequent rejections of low offers in the ultimatum game suggests that the Ghanaian employees had strong feelings about what constituted socially acceptable sharing behavior. Many of them were willing to punish those who acted unfairly, even when there was a cost associated with doing so. Similarly, the commonplace fining of low offers in the third-party punishment game can be taken as evidence that individuals were motivated to punish antisocial behavior even when that behavior was not directed toward themselves and when it was costly to punish.

That high offers also attracted rejections in the ultimatum game suggests that the Ghanaian employees were averse to inequality even when that inequality was in their own favor. However, the explanations given by key informants a day or two after the sessions indicated that subjects rationalized their rejections of low and high offers somewhat differently. Low offers were rejected because they were seen as unfair, while high offers were rejected because they raised suspicions and fears of repercussions. We have every

reason to believe that the employees understood that play was anonymous. However, it seems that they found it difficult to act *as if* play was anonymous when they imagined their playing partners doing something they would not do themselves. Key informants who were also informed of the absence of fines in the case of high offers in the TPG found this to be entirely consistent with their explanation: player 3s had no reason to fear repercussion because they were not accepting the offer on their own behalf, and they had no reason to worry about repercussions aimed at player 2 since that player was incapable of action under the rules of the game and therefore beyond reproach.

TABLE 17.9 *Explaining Variations in the Minimum Unpunished Offers in the Third-Party Punishment Game*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age	3.7383	7.0845								
	(2.8595)	(4.9317)								
Female (dummy)	−1.4978	0.0849	0.9366							
	(6.2738)	(7.2660)	(7.3690)							
Education	5.4253	5.5653	6.3682	6.2927	5.3866	6.4637	6.8796	4.8914	5.0006	4.9585
	(3.3058)	(4.0582)	(4.0901)	(3.9820)	(3.8212)	(3.5120)^	(3.5114)^	(2.8974)^	(2.8396)^	(2.8151)^
Income	−2.3521	−2.8932	−2.8424	−2.7437						
	(3.1378)	(3.3029)	(3.3607)	(3.2175)						
Siblings		4.4350	2.7355	2.6892	2.4557					
		(3.5463)	(3.4019)	(3.3282)	(3.3027)					
Children		−0.5236	4.0990	3.9511	3.5442	3.4517				
		(4.5749)	(3.3091)	(3.0483)	(2.9979)	(2.9750)				
Religious attendance		2.7040	2.2520	2.3876	2.4911	3.2254	3.5521			
		(3.8678)	(3.9227)	(3.7144)	(3.6965)	(3.5380)	(3.5447)			
Tenure in workforce		−4.5084	−2.1628	−1.9937	−1.8310	−1.3241	−0.4621	−0.9032		
		(3.7692)	(3.4569)	(3.1397)	(3.1205)	(3.0244)	(2.9466)	(2.9138)		
Urban-born (dummy)		−1.4701	−1.7306	−1.7653	−2.8353	−4.7831	−5.6136	−4.2092	−3.9935	
		(7.3646)	(7.4917)	(7.3670)	(7.2283)	(6.6911)	(6.6865)	(6.5384)	(6.4191)	
Constant	5.9435	−10.0964	6.2579	6.7061	6.8830	10.3426	12.0346	19.0169	17.5662	14.7199
	(13.1302)	(18.3845)	(14.6891)	(14.0314)	(13.9699)	(13.0828)	(13.0673)	(11.0553)^	(9.8894)^	(8.6945)^
Observations	39	39	39	39	39	39	39	39	39	39
R-squared	0.14	0.24	0.18	0.18	0.16	0.15	0.12	0.09	0.09	0.08
Adjusted R-squared	0.03	$2.3e^{-3}$	−0.03	$2.0e^{-4}$	0.01	0.02	0.01	0.01	0.04	0.05

Source: Author's compilation based on author data.
Notes: Standard errors are in parentheses. The estimated coefficients in column 10 are not affected by dropping outliers, which increases the size and significance of the coefficients. The residuals relating to the regression in column 10 are free from heteroscedasticity (Cook and Weisberg test). However, they are subject to both skewness and kurtosis.
^significant at 10 percent level

Before discussing the results that compare rural- and urban-born subjects' behavior, there are several other findings that are worthy of note. First, in every game, individuals with higher monetary incomes made higher offers. There are two possible explanations for this result. Either richer players, knowing that they were likely to be richer than their playing partners, were more generous, or being richer rendered the stake in the game less attractive and so richer subjects placed less weight on their desire to be self-serving

compared to the weight they placed on acting fairly. Second, subjects with more siblings made higher offers in the dictator game and the third-party punishment game. One possible explanation for this result is that individuals who grew up among more siblings internalized norms of equitable sharing more readily. Third, subjects with more children made higher offers in the ultimatum game and third-party punishment game. Individuals engaged in socializing children in sharing norms (possibly in preparation for a labor market that rewards other-regarding behavioral tendencies) may themselves be more inclined, owing to dissonance reduction, to adhere to such norms. Fourth, subjects who were more religiously active made larger offers in the dictator game, possibly because their religion encouraged them to be other-regarding. Fifth, more-educated subjects undertook more fining of low offers in the third-party punishment game, possibly because education both reinforces ethical values and bestows a sense of authority or initiative. And sixth, subjects with longer tenure in the workplace accepted lower offers in the ultimatum game, possibly because they were aware of the relative income insecurity of others.

Finally, the results indicate that there may be a difference in behavior between rural- and urban-born manufacturing employees. In the ultimatum game, urban-born employees made higher offers even though they accepted lower offers than rural-born employees. It seems unlikely that sharing norms would have been internalized to a greater degree among the urban-born considering that, in the dictator game, where there is no sanctioning, behavior between the two subject pools was indistinguishable. In the UG, the difference in offers arises because some urban-born subjects increased their offers when faced with the threat of rejection. However, there may be another way of looking at the data. Figures 17.4 and 17.5 indicate that there was a relatively high degree of consistency between UG offers and rejections within the urban-born samples: over 80 percent of the offers were in the fully acceptable (to their kind) range of 40 to 50 percent of the stake, whereas only 43 percent of rural-born subjects made the fully acceptable (to their kind) offer of 50 percent. This could be taken as evidence that the rural-born were less certain about what sharing norm to apply. Combining this with the null finding that, in the other games, the behavior of the rural-born was indistinguishable from that of the urban-born, we might tentatively conclude that the rural-born are undergoing a period of secondary socialization into the norms that prevail in Accra.

However, this conclusion needs to be treated with considerable caution. The analysis suffers from several critical drawbacks. First, the small sample sizes have eroded the power of our statistical tests—that is, they have increased the likelihood that we are erroneously accepting null hypotheses. This possibility notwithstanding, the fact that a significant difference in behavior in the ultimatum game could be identified, despite the small sample sizes, suggests that we could learn a great deal from a more comprehensive study of behavioral variations between people who were born and raised in cities and people who have migrated to cities having been born and raised in rural settings. The second drawback that would need to be addressed in a more comprehensive study relates to the absence of information about how individuals who were born and then remained in rural areas might play the games. Such information would allow us to establish whether the behavior of the rural-born individuals was consistent with their rural upbringing. Without this check, it is difficult to rule out two alternative explanations for the significant differences in behavior identified here: the observed variations in behavior between rural- and urban-born individuals could be due to the effect of migration rather than that of birthplace; or those who are less inclined to share fairly, while being more indignant when others do not share fairly with them, could be more likely to migrate. The only additional piece of evidence that can currently be brought to bear on these issues is that, when the urban-born dummy is replaced by a dummy variable that takes the value one for all migrants regardless of whether they are urban-or rural-born and zero otherwise, the latter is never significant. It is migrating from a rural area to Accra rather than migrating per se that is associated with a difference in behavior. Finally, in order to further explore the tentative conclusion that the rural-born in this study were being secondarily socialized into the sharing norms that prevailed in Accra, we would want to know how long the rural-urban migrants had been in the city. Then we could test the hypothesis that longer exposure to the norms of the place in which one currently lives leads to greater adherence to those norms.

NOTES

1. This theory might explain why, in this volume, we see more punishment of individuals behaving unfairly in the games in Africa, where climatic shocks are common, compared to the Amazon and Papua New Guinea, where they are not.

2. This was necessary due to problems recruiting subjects during the period of the World Cup soccer semifinals and finals.

3. In earlier runs of the analyses, I also included an index of individual asset holdings derived from a series of dummy variables indicating the ownership of particular assets and the number of people with whom the subject regularly shared meals. These variables are not directly comparable with the wealth measures and household size measures used elsewhere in this volume, did not significantly improve the fit of the regressions, and used up valuable degrees of freedom. So I have excluded them from the analyses presented here.

4. Note that in many sites these regressions included household size and wealth. Although data relating to each of these concepts were collected for the Ghanaian employees, they were not comparable to the data collected elsewhere and so have been excluded from the regression analyses. Because a large proportion of the employees did not live with their families, either lodging with others or sleeping in their place of work, household size was defined as the number of people with whom they usually ate an evening meal. Wealth was measured by an index generated from a series of dichotomous variables capturing ownership of various durables. When included in the regression analyses, neither of these variables is significant.

5. Additional regressions were run to test for problems of understanding and effects associated with the different research assistants conducting the interviews. None were found. There was no reason to expect contamination across sessions.

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Chapter 18

Prosociality in Rural America: Evidence from Dictator, Ultimatum, Public Goods, and Trust Games

Jean Ensminger and Kathleen Cook

In phase 1 of the Roots of Human Sociality Project, we had no fully market-oriented societies represented from the developed world, but we did have a U.S. student population (Henrich and Smith 2004). In an effort to broaden our market integration spectrum, we chose to include a town in rural Missouri as our representative population from the developed world. We also included another U.S. student population (chapter 9, this volume, available at: http://www.russellsage.org/Ensminger) to create a baseline for comparison with both this study and studies of other university populations.

The levels of prosociality demonstrated in the Missouri games were markedly higher than what we are used to seeing in experiments with U.S. undergraduates. It is now well documented that age affects prosociality levels all the way up to and through the college years (Fehr, Bernhard, and Rockenbach 2008; Harbaugh, Krause, and Liday 2002; Sutter and Kocher 2007), thus calling into question the representativeness of university undergraduate populations in inferences about social norms across a population. John List (2004) also finds a substantial impact for age over the entire life cycle.

Other studies among nonstudent populations in the developed world have also found high levels of prosociality similar to those reported here for each of the games, so it does not appear that this population is merely an exceptional outlier. These findings contribute to a growing body of evidence that finds both high levels of prosociality in developed societies compared with less-developed societies and significant differences between student and nonstudent populations, nonstudents being markedly more prosocial.

In this chapter, we present experimental results from the dictator game (DG), the strategy method ultimatum game (UG), the public goods game

(PG), and the trust game. We find the highest levels of prosociality in our world sample. The striking finding from these games is that this rural U.S. population demonstrated consistently high prosociality across all measures in all games: offers, returns, and rejections of low offers at cost to the individual. Indeed, in the DG (mean offer = 47 percent) and the UG (mean offer = 48 percent), because there was virtually no variation in offer behavior, it is not possible to test for any demographic effects. Consistent with the high prosocial behavior that we observe in the offers across all four games, we also find high rejection rates in the strategy method UG, with close to 30 percent of the sample rejecting offers of 40 percent. From the PG, we see overall high offers (mean = 62 percent), and perhaps even more impressive, 36 percent of the population contributed 100 percent of their stake to the common pot. In the trust game, we have evidence of both considerable trust (high player 1 offers of 63 percent) and considerable trustworthiness (high player 2 returns of 173 percent). These findings are particularly interesting because they come from a rural population of relatively modest economic means: 12 percent of the sample had household incomes below the U.S. poverty line. Given that this rural Missouri population is also in the midwestern Bible Belt, with near-universal belief in a world religion, these findings are directly in line with the overall results of this volume. This population has highly developed market institutions, its religious orientation is toward a world religion, and it demonstrated consistently high prosociality across a range of diverse experiments.

ETHNOGRAPHIC BACKGROUND OF HAMILTON, MISSOURI

Our U.S. sample is drawn from the small town of Hamilton, Missouri, a community that is not only representative of many rural towns across America but also small enough, with a population of 1,800, that most town folks either know all the other individuals in town personally or at least have some acquaintance with all the families. This quality made the site ideal for comparison with the other small communities that we sampled from the developing world.

Kathleen Cook conducted fieldwork in Hamilton, Missouri, in 1989, 1990, 1991, 1995, 2000, and 2001, and this ethnographic description draws on her extensive ethnographic knowledge of the community (for more

details, see Cook 1993). Hamilton is in the northwestern part of the state, about seventy miles from Kansas City. It is situated in an area of rolling hills with rich prairie soils that historically supported a robust farming economy. The agricultural base of the region diminished during the twentieth century, declining rapidly in the 1980s. Today transfer payments (Social Security and various forms of social welfare) comprise the largest source of income in the county, and wage labor has replaced farming; the population is aging as young people leave for jobs in nearby urban areas.

Hamilton developed as the commercial center of Caldwell County. It was served by both the railroad and a federal highway, and its once-thriving main street was a market for the farming population of the region. Elderly residents of the town recall stores staying open until 11:00 PM on Saturday nights when farmers came to town to trade and socialize. Today Main Street in Hamilton is empty on nights and weekends, and its mobile population follows interstate highways to retail centers in nearby urban areas. Storefronts that once housed hardware, dry goods, or farm supply stores have been replaced by gift shops, antique malls, and restaurants catering to tourists and day visitors. The town has capitalized on its link to J. C. Penney, whose boyhood home has been moved to the center of town and restored. A museum houses memorabilia relating to Penney's life in Hamilton and the early development of his commercial enterprise. Caldwell County also attracts Mormon pilgrims traveling to nearby holy sites—the places where Mormons settled in the nineteenth century before being driven west.

Although part of the economic base is dependent on tourists, town residents still buy groceries and gas locally, meet for coffee or lunch in Main Street cafés, and buy insurance and real estate from local agents. They send their children to Hamilton schools, attend Chamber of Commerce and Lions Club meetings, play golf or swim at the municipal facilities, and see each other frequently in church and on the streets. Hamilton is typical of villages elsewhere in the country. Residents are linked by blood, marriage, and proximity. They share their small-town locality, a fund of local information, and norms about how to conduct life in a small community.

Hamilton residents do not routinely share economic resources, but they do contribute to the material and emotional welfare of community members who suffer a loss: a family burned out of their home, for instance, or a young mother widowed by an accident. Neighborly support in a crisis is a hallmark of community life.

Cheap information is another characteristic of village life. Residents trade information formally through their organizations and publications, but more often informally through gossip and face-to-face meetings in town. It is not easy to hide good news, bad news, or behavior in a small town, and the rapid spread of gossip through the many connections in the community ensures that secrets are shared rather quickly. This cuts two ways. People who do not conform to local norms suffer the psychic punishment of being gossiped about, and even ostracized, by fellow community members, but the common knowledge that people hold about each other also includes information about who is trustworthy and reliable. At the time of this research in 2001, there are no check-cashing cards in Hamilton. Merchants know whose checks they can safely cash.

Being trustworthy and unassuming are highly valued in Hamilton. These norms are institutionalized in the practices of the town. Citizens who contribute their time and money to community endeavors without calling attention to themselves or appearing to have self-interested motives are considered upstanding and trustworthy. People are friendly when meeting on the street, greetings are always exchanged, and understatement is the rule. Behavior that hints of arrogance and boasting will activate the gossip channels. Community service clubs have memberships that cut across most occupations, and there is an emphasis on the equal standing of community members, even a fiction that hiding wealth makes everyone equal. A merchant's success depends on living a modest lifestyle, refraining from flaunting wealth, and avoiding high visibility. People who deviate from the norms might, in a charitable moment, be termed “different” but are more commonly assumed to be gaining at the expense of others (“lining their own pockets”).

These norms are so commonly practiced that appearance and demeanor do not usually distinguish the wealthy from their less-prosperous neighbors. Wealthy residents avoid expensive cars, clothes, houses, and other signs of their material success. They join the informal coffee groups that meet several times a day in the cafés and gas stations around town to hash over issues of local importance. On any morning a coffee group might include the usual set of retired farmers and town residents, plus the banker, a retired executive, and someone from the newspaper. Banter and insult are conversational devices in the coffee group. Frequent joking is one of the ways in which

residents reinforce their connections, while pointing out the frailties of their peers.

Residents of Hamilton live in a reinforcing milieu. Although many Hamiltonians work outside town, their connections to their neighbors are strengthened through interactions in schools and churches, recreational activities, and frequent meetings on Main Street. The regularity of informal meetings provides a mechanism by which information and editorial opinions are freely shared, thus bolstering the inclusiveness of community membership while at the same time making clear the behavior that is expected of members.

SAMPLE RECRUITMENT AND EXPERIMENTAL METHODS

These experiments were conducted in July 2001 by both authors, together with two local research assistants and one nonlocal university undergraduate. The dictator, strategy method ultimatum, public goods, and trust games were run over a five-day period.

Running experiments in the United States presents enormous challenges for subject recruitment. Americans are busy, leery of con schemes, and especially suspicious of invitations that sound like one could earn money “for nothing.” We developed strategies to try to get around these problems and recruit a high percentage of townspeople in the hope of drawing a diverse and representative sample. We succeeded in drawing fully 20 percent of the entire adult population of Hamilton, Missouri, which was all that we needed to fulfill our target.[1] We attribute the success of our subject recruitment to our prior ethnographic contact with the population and to the fact that we worked through important community members, thereby building the trust necessary to convince people to turn out for the experiments. We also put considerable planning into the timing and logistics of the games to make attendance easy.

After publicizing the games with the help of local research assistants and members of community-wide organizations, we recruited players from diverse socioeconomic and demographic groups in the town using open enrollment and snowball sampling that targeted different subsectors of the society. The participation of high-status residents, including the bank president and prominent members of the Lions Club, encouraged other

prosperous residents to participate; we had feared that the town elite would be the most difficult to attract, and we began recruitment by attending a local Lions Club meeting to explain the project and sign up local leaders. We also recruited participants by walking Main Street, standing in the local grocery store, going door to door, attending coffee groups at the local diners, visiting the local prison to sign up staff workers there, and visiting the part-time workers at the local glove factory, one of the lowest socioeconomic strata in town. The economic development assistant who staffed the telephone at the Penney Museum (a clearinghouse for information) encouraged interested, but cautious, residents to participate by vouching for the research team. Open enrollment was so successful that demand for inclusion in the games surpassed our need for players. All games were one-shot games, and each game was run with a fresh set of players.

Snowball sampling and self-selection are never the most ideal methods for generating a truly representative sample. One could conjecture that those who agree to participate in a research project are more likely to be civic-minded and inclined toward prosocial norms. We cannot rule this out; however, the opposite is equally plausible. Once word got out that people were earning significant amounts of money in these games, there may have been a tendency for those with more materialistic inclinations to sign up. If this was the case, it did not show up as differences in play behavior over the course of our five days of games.

Rural Missouri served as the pilot site for our overall project, in part to help us decide which games to run. As a consequence, the series of games that we ran was different than that which we chose for the final protocol of the project; the third-party punishment game was not conducted at the pilot stage. Because these experiments were conducted prior to the development of the final protocol for the cross-cultural project, there are some important differences between how the dictator and ultimatum games were run and the methodology for the rest of the project. In Hamilton, the DG and UG were run with different players rather than in sequence with the same players. The UG was run using the strategy method; however, player 2s were asked what their minimum acceptable offer (MinAO) would be rather than what their specific responses to each possible offer would be. This means that there are no data on rejection of offers above 50 percent, as all agreed to accept at least 50 percent. For comparison's sake, we note that among U.S. undergraduates (see chapter 9, this volume, available at:

http://www.russellsage.org/Ensminger) there were no rejections of hyper-fair offers in the UG.

The games run in other villages around the world purposely employed simplified visuals involving the manipulation of real coins and bills to help clarify the arithmetic associated with the game payoffs. These visuals were not employed with the U.S. sample owing to the subjects' high education levels. In a meta-analysis of dictator games, Christoph Engel (2011) found a highly statistically significant positive correlation between offers and player 1s who handled coins or notes. Those who handled cash gave substantially more on average and were both less likely to give nothing and more likely to give everything. If this difference biased the offers at our other sites upward, it means that our overall cross-cultural results for our correlations with market orientation would have been even stronger, as we find the highest offers in the Hamilton site, where money was not handled in the dictator, ultimatum, or trust games.

The only other difference between the Hamilton games and those of other sites concerns the demographic data that were collected. Because we had not yet finalized the overall project survey instrument, some questions used in the group project were not asked, while many other demographics not collected elsewhere were collected here. Religious affiliation was not collected individually from the subjects. However, we were able to return to our local assistants, who had helped to recruit subjects and organize the games, and ask them about the players' religious affiliation from their personal knowledge of them. They reported that all of the subjects were Christian, and this is how they were coded in the database: no denominations were recorded. This classification is consistent with the fact that there were no foreign names among the players, and none that suggested Judaic or Muslim origin. Hamilton is in the heart of the rural midwestern Bible Belt. The market integration survey to calculate percentage of the diet purchased in the market was also not conducted in Missouri; this population was coded as 100 percent market-integrated. In most other respects, we followed the protocols developed for this pilot and subsequently adopted for the broader project, including the scripts and the protocol for the logistics of isolating and moving players through the game.

Table 18.1 presents the summary demographic statistics from the 2000 U.S. census for Hamilton and the demographics of our samples for each of the games. Comparing the overall game sample to the census data, we can

see that we sampled more women (61 percent versus 54 percent) than were present in the population at large. We also oversampled married individuals (71 percent versus 57 percent). In contrast, our income data match the overall demographics of the population quite nicely, for both individual income and household income. We take up the specifics of individual game samples later, in our discussion of each game.

Figures 18.1 through 18.6 present the sample distributions for the Hamilton subjects who participated in the games. These distributions represent the six control variables used in the regression analyses.

THE DICTATOR GAME RESULTS

The stakes in the dictator game were set to be roughly equivalent to the daily minimum wage, or $50, which worked out nicely for decimal divisions of the currency. The show-up fee was set at $20, which was deliberately set higher than the target of 20 percent for the project games. This was a concession to the U.S. environment, where time is scarce, and where we feared that anything less than $20 would not be sufficient remuneration in the event that a player received nothing in the game. If anything, an increase in the stake size relative to that at other sites might have taken the pressure off player 1 to make a high offer, but that is not how the Hamiltonians played. These stakes appeared to be about right for getting people's attention with a meaningful (nontrivial) amount of money.

In table 18.1, we see the demographics for the sample population that played each game compared to the demographics for Hamilton derived from U.S. census data. The sample playing the dictator game was younger (median age of thirty-seven) than the samples for all of the games (median age of forty-two), and they were also younger than the median adult age in Hamilton, which was forty-seven. Although the individual incomes and household incomes among this sample were quite similar to those of the population at large, based on the census data, the median household wealth was considerably higher than that for the samples playing the other games ($68,500 versus $30,000 for the players of all games). The subjects playing the DG were also more likely to be married (82 percent) than Hamiltonians generally, according to the census data (57 percent), and the sample of players for all of the games (71 percent). However, the demographics for those who played the ultimatum game were considerably different from

those for the DG players. Notably, the UG subjects better matched the demographics of both the census data and the pool of overall game players. Given that the behavior of players in the DG and the UG was similar, while the demographics were different, it does not appear that the skew in the demographics of the DG sample biased our results. We revisit the discussion of demographics when we discuss the UG offers.

TABLE 18.1 *Hamilton Demographics, by Game*

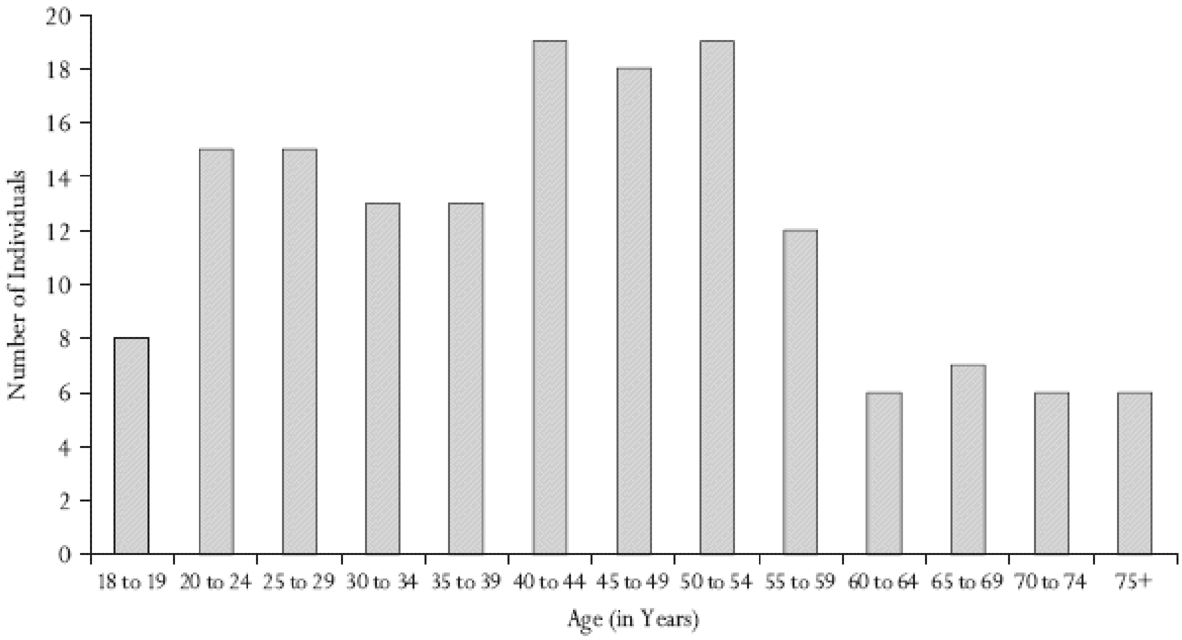
	Hamilton 2000 U.S. Census Data		All Games		Dictator Game		Ultimatum Game		Public Goods Game		Trust Game	
Variable	N	Value	N	Value	N	Value	N	Value	N	Value	N	Value
Age (adults over eighteen only)—median	1,324	47	157	42	28	37	54	45	25	41	50	45
Female (percentage)	1,813	54	157	61	28	54	54	61	25	68	50	62
Years of education (median)	1,813	12	157	14	28	14	54	12	25	12	50	14
Household size (median)	744	2	153	3	28	3	53	2	23	3	49	3
Individual income of player (median)[a]		21,667	157	20,000	28	25,000	54	20,000	25	20,000	50	20,000
Total household income (median)[b]	735	32,560	156	35,000	28	35,000	54	35,000	24	45,000	50	45,000
Total household wealth (median)			157	30,000	28	68,500	54	15,000	25	15,000	50	44,500
Married (percentage)	1,379	57	157	71	28	82	54	65	25	76	50	70
Own home (percentage)	744	66	150	75	21	75	54	76	25	68	50	78
Length residence this town (median)			154	28	28	19	51	34	25	22	50	29
Number of computers in household (median)			148	1	28	1	45	1	25	1	50	1
Frequency of Internet use per month (median)			157	4	28	12	54	1	25	1	50	12
Frequency of listening to radio news per month (median)			146	1	28	7	43	12	25	1	50	1
Frequency of listening to TV news per month (median)			147	20	28	12	44	20	25	20	50	20
Number of local papers subscribed home (median)			156	1	28	1	53	1	25	1	50	2

Source: Authors' calculations based on author data and U.S. Census Bureau (2000).

[a]Individual income data were collected by asking players to check an income range ($0 to $4,999; $5,000 to $9,999; $10,000 to $14,999; $15,000 to $24,000; $25,000 to $34,999; $35,000 to $44,999; $45,000 to $74,999; and over $75,000). We assigned the midpoint of the selected range to each individual.

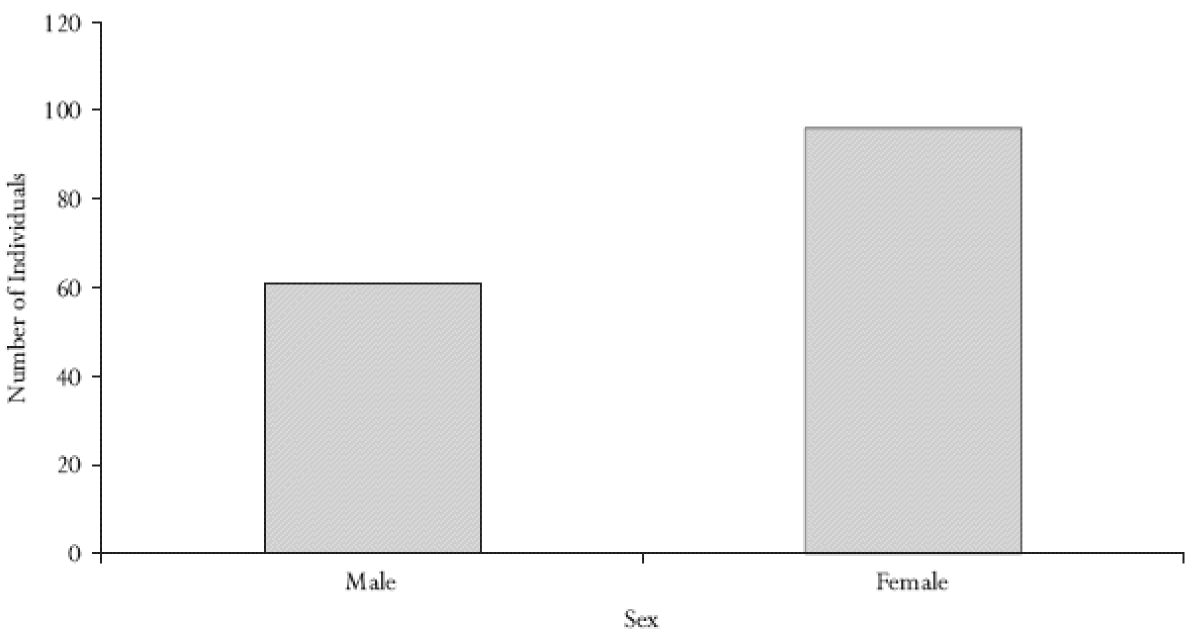
[b]Household income ranges were in increments of $10,000 from $0 to $50,000 and increments of $25,000 from $50,000 to $100,000; the top range was over $100,000.

FIGURE 18.1 *Hamilton Age Distribution*



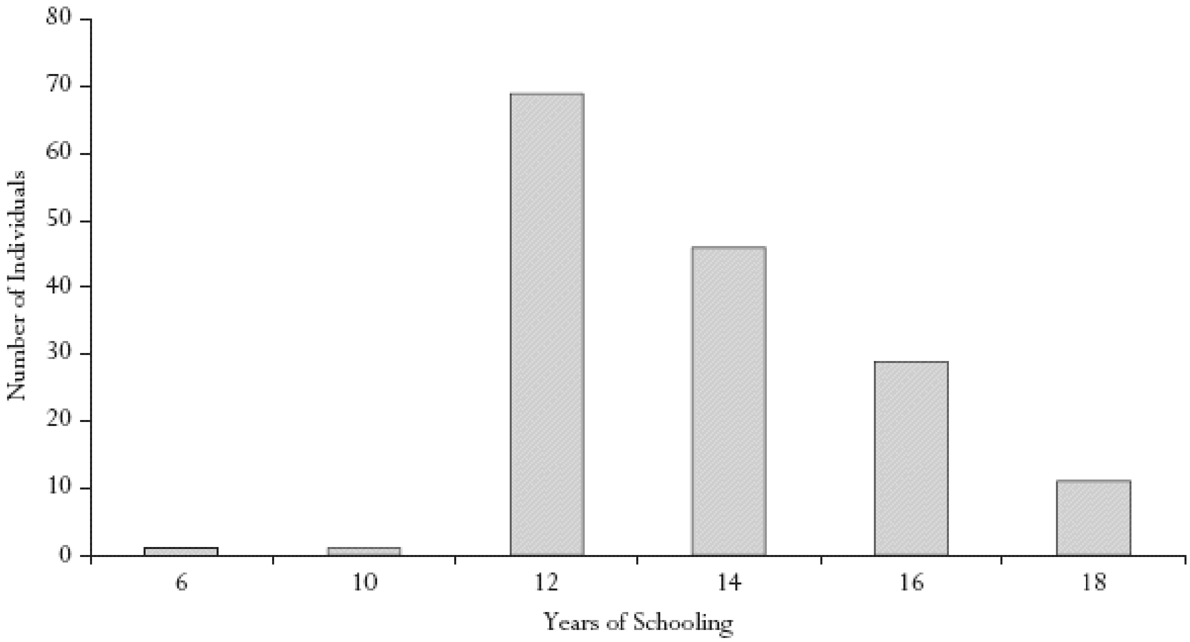
Source: Authors' calculations based on author data.

FIGURE 18.2 *Hamilton Sex Distribution*



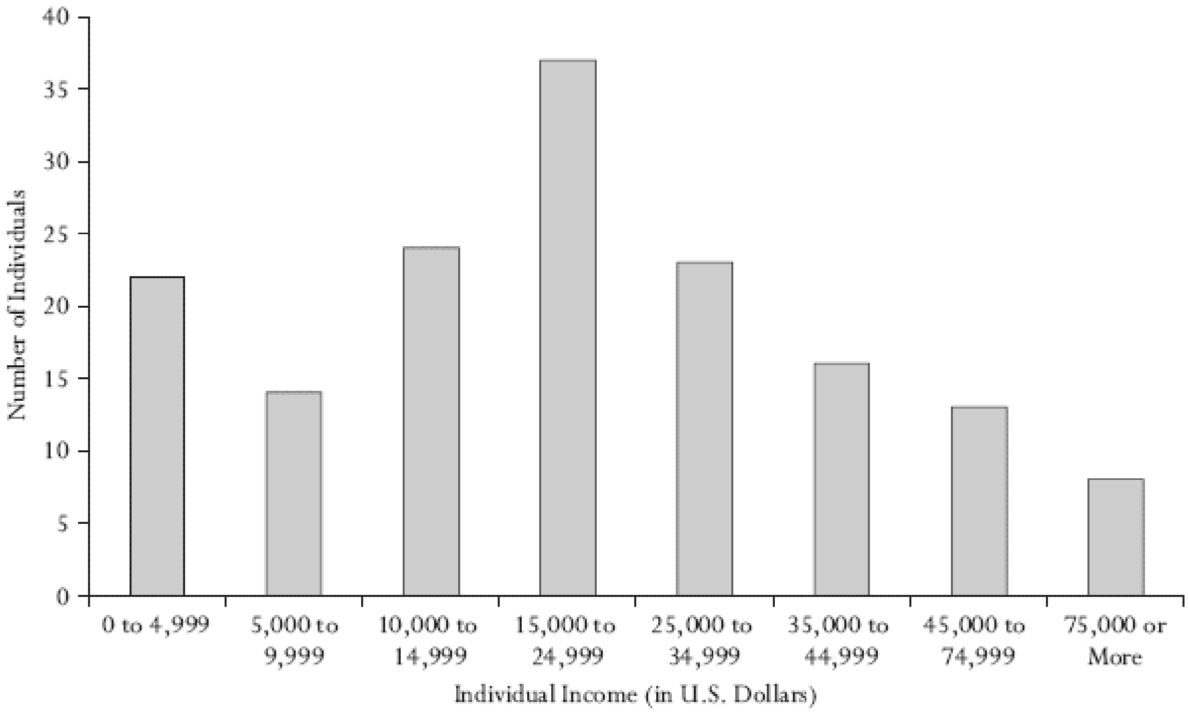
Source: Authors' calculations based on author data.

FIGURE 18.3 *Hamilton Education Distribution*



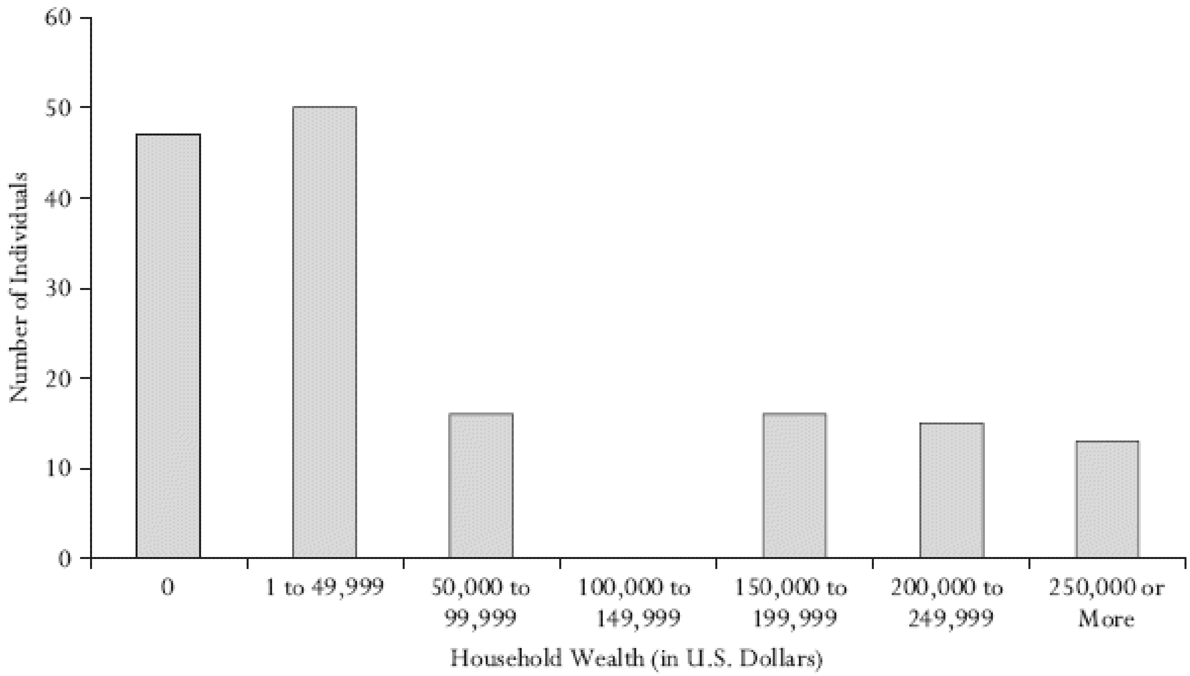
Source: Authors' calculations based on author data.

FIGURE 18.4 *Hamilton Individual Income Distribution*



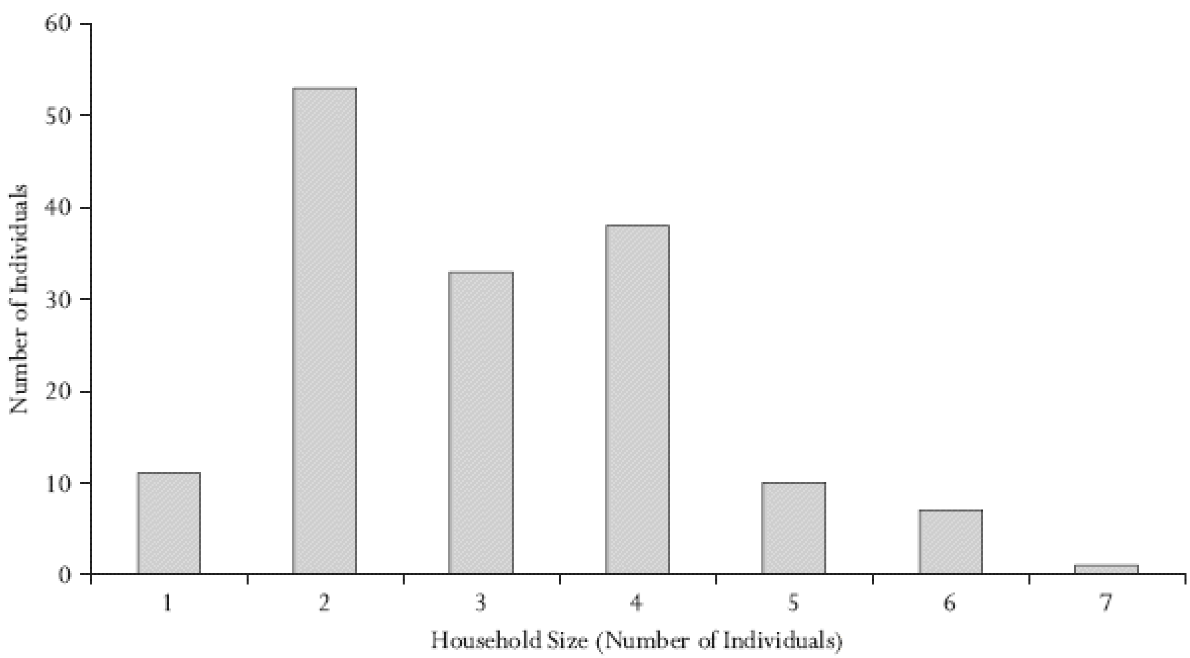
Source: Authors' calculations based on author data.

FIGURE 18.5 *Hamilton Household Wealth Distribution*



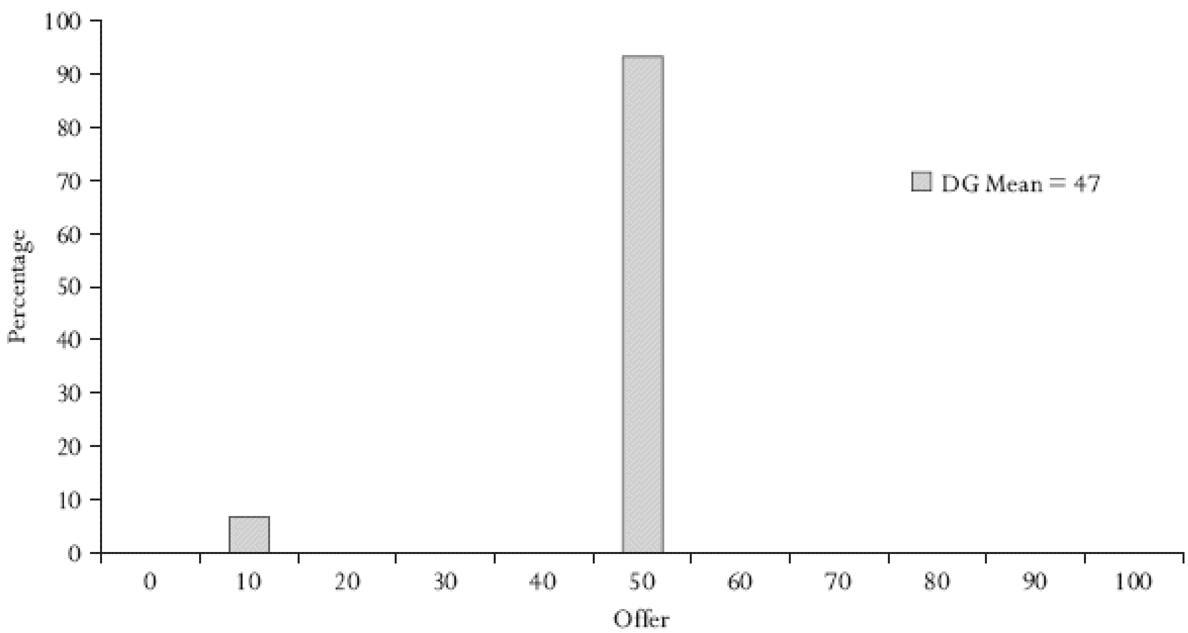
Source: Authors' calculations based on author data.

FIGURE 18.6 *Hamilton Household Size Distribution*



Source: Authors' calculations based on author data.

FIGURE 18.7 *Dictator Game Offers (N = 15)*



Source: Authors' calculations based on author data.

In figure 18.7, we see the distribution of offers in the dictator game. The DG results are striking for their uniformity. All but one player out of fifteen gave 50 percent. Given that there was virtually no variation in the sharing behavior, the demographic differences that we see in figures 18.1 to 18.6 appear to have no impact on prosocial behavior in the dictator game.

Although these DG results are strikingly different from what is usually reported for university undergraduate student populations (see chapter 9, this volume, available at: http://www.russellsage.org/Ensminger_Chapter7.pdf), they are in line with increasing numbers of reports from researchers who have sampled nonstudent populations in developed societies. Consistently, nonstudent populations have been shown to demonstrate far higher levels of prosocial behavior than students, as we find here. In a recent meta-analysis of DG results, Engel (2011, 597) reports that “students are much more likely to give nothing, and they are less likely to choose the equal split, or to even give everything.” In Engel's data, the differences are extreme at offers of 0 percent (about 40 percent for students; 10 percent for nonstudents), 50 percent (about 15 percent for students; 30 percent for nonstudents), and 100 percent (about 5 percent for students; 15 percent for nonstudents).[2]

Two recent studies specifically compare dictator game results for student populations with those for nonstudent populations in the United States. Jeffrey Carpenter, Stephen Burks, and Eric Verhoogen (2005) compared a relatively affluent college population, a less-affluent community college population, and blue-collar employees at a Kansas City distribution center. In the dictator game, the Kansas City workers were more generous than the students at either college; their mean offers were 45 percent versus 25 percent for the more-affluent undergraduates and 33 percent for the less-affluent. Mitchell Hoffman and John Morgan (2011) specifically set out to test the proposition that selection pressures among businesspeople reduce or eliminate prosocial choices, as put forth by Steven Levitt and John List (2007), who have also argued that student samples most likely exaggerate the level of prosociality in economic experiments. Hoffman and Morgan found just the opposite. They purposely chose businesspeople from two professions that might be expected to self-select for highly competitive individuals: the pornography industry and the Internet. They found that Internet businesspeople contributed over 250 percent more in the dictator game than did Berkeley undergraduates (Hoffman and Morgan 2011, 19). In another version of the DG, they found that students gave on average 14 percent of their stake, while adult professionals gave 39 percent (10).

We turn now to the ultimatum game results, which provide further evidence of prosocial behavior among this Missouri population.

THE STRATEGY METHOD ULTIMATUM GAME

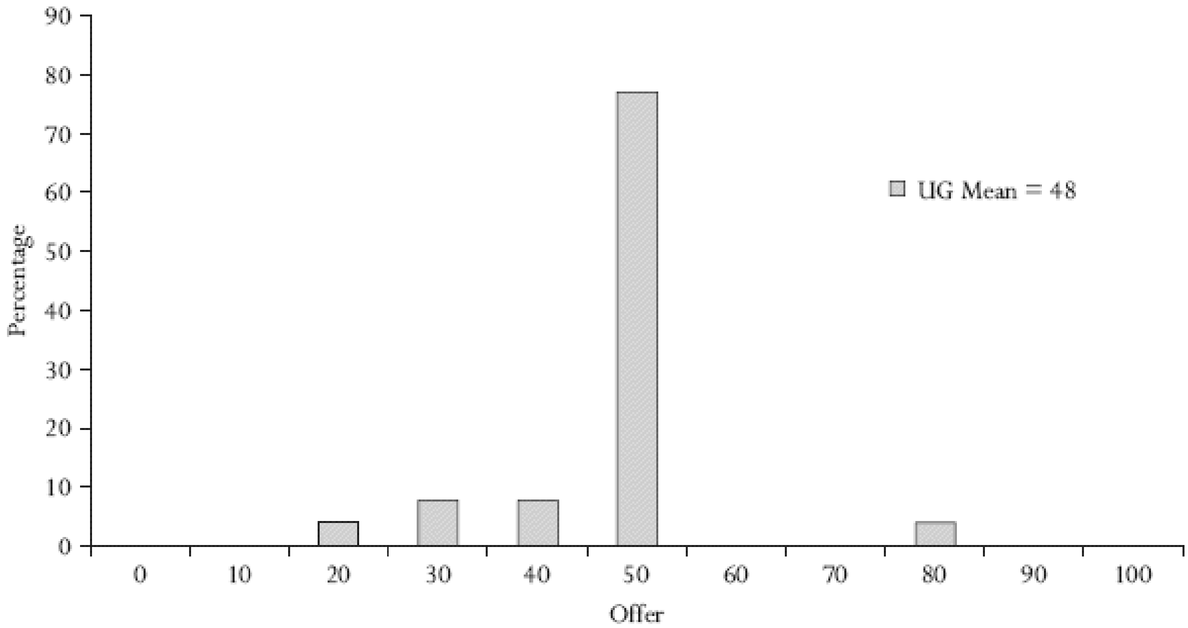
Like the dictator game, the strategy method ultimatum game was played for a stake of $50 and a show-up fee of $20. The strategy method UG was run prior to the finalization of the design of the core games for the cross-cultural project. As a consequence, these games differed slightly from those run in other sites. First of all, the Hamilton players used in this UG did not also play the DG; this ultimatum game was a stand-alone game. Fresh players were used in each of the two sessions. Second, player 2s were asked what their minimal acceptable offer was, rather than asked to respond to every conceivable offer from 0 to 100. Given that no one rejected 50 percent, we have no data on rejections of hyper-fair offers, so it is not possible to test whether this sample exhibits the U-shaped rejection function observed in some sites. We do know that there was no such tendency among our U.S.

undergraduate population (chapter 9, this volume, available at: http://www.russellsage.org/Ensminger_Chapter9.pdf), from whom we elicited rejection responses for the full range of offers from 0 to 100. The ultimatum game was run in two sessions, and an odd number of players turned up for each session. In both sessions, we used the extra player as a player 2, who played against a randomly chosen offer selected from among the player 1 offers.

In figure 18.8, we see that the offers in the UG were quite similar to those made in the DG, with a mean of 48 percent versus 47 percent in the DG, and close to double the sample size. These UG results (with close to double the sample size) parallel the high DG results. This compares to a mean of 41 percent from Hessel Oosterbeek, Randolph Sloof, and Gijs van de Kuilen's (2004, 177) meta-analysis of UG results from twenty-eight U.S. studies (including both student and nonstudent populations). Among the Kansas City workers from a distribution center used in Carpenter, Burks, and Verhoogen's (2005) ultimatum game experiment, the average UG offer was 45 percent. Natalie Henrich and Joseph Henrich (2007, 163) also report UG offers among an immigrant U.S. population in Detroit with a mean of 41 percent and a strong mode at 50 percent, with over 50 percent of the players offering 50 percent.

Referring back to the demographics from table 18.1, we find that the median age and percentage married for the UG players were far more in line with both the average sample demographics for all game players and with the Hamilton census demographics than was the case for the much smaller sample who played the DG. The median household wealth of those who played the UG was actually below the median household wealth of players for all games, which is the opposite of the median wealth among DG players. Given that the offers were extremely high and showed low variance across both games, it would appear that the skew in the demographic distributions did not have an impact on game behavior. As was the case with the DG, there is not sufficient variance in the offers to run regression analyses for the UG.

FIGURE 18.8 *Strategy Method Ultimatum Game Offers (N = 26)*



Source: Authors' calculations based on author data.

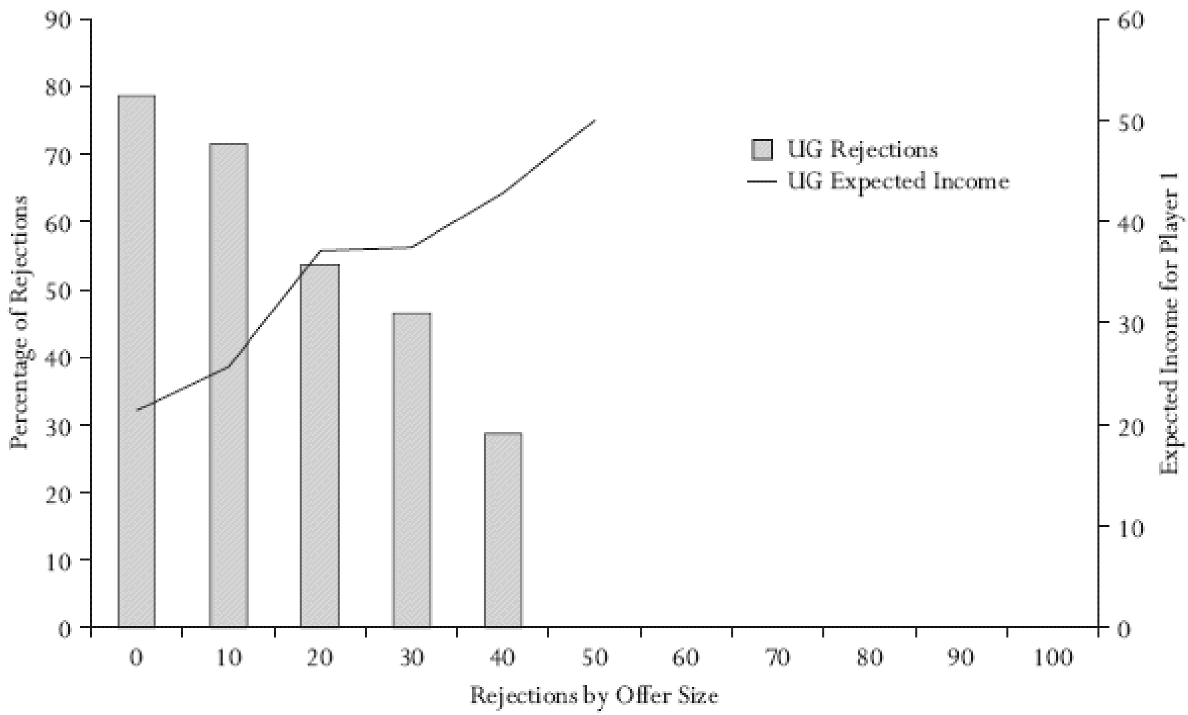
In figure 18.9, we provide the rejection data for player 2 in the strategy method ultimatum game. These data are consistent with the general pattern of prosocial behavior among the U.S. sample. Close to 30 percent of the sample rejected offers as high as 40 percent. The income-maximizing offer (IMO) at this site was 50 percent, which is consistent with the fact that fully 77 percent of the players offered 50 percent.

We calculate the minimum acceptable offer in the strategy method UG by coding the highest offer that a player 2 was willing to reject, thus ensuring that neither player 2 nor player 1 received any of the game proceeds. We note in figure 18.9 that close to 30 percent of the sample were prepared to reject offers of even 40 percent, representing extremely vigilant behavior regarding fairness. However, since there was also considerable variation in behavior, we were able to run regressions on the sociodemographic predictors of MinAOs. In table 18.2, we see the regression results.

In the basic model, we control for age, sex, education, individual income, household wealth, and household size. Given the small sample size, we dropped all insignificant variables one by one, beginning with the least significant. Just as none of our demographic controls predict variations in offer behavior, none predict the minimum acceptable offer. During the game,

a number of players who said they would reject 40 percent offers volunteered that anything less than a full 50 percent, which they referred to as the only fair offer, was completely unacceptable. This sentiment, or something close to it, appears to have been shared widely across the demographic spectrum of the subject population.

FIGURE 18.9 *Strategy Method Ultimatum Game Rejections (Player 2)*



Source: Authors' calculations based on author data.

THE PUBLIC GOODS GAME

Twenty-five new individuals played a public goods game in one session. Each player was provided with an envelope and ten $5 bills ($50 total); no additional show-up fee was paid. They were told that they would be playing the game with four other individuals in the room, but they did not know which other four they were playing with until the final distribution. All players understood that they would be ushered into a private room where they could put as much or as little of the $50 into the envelope as they chose. Whatever they kept remained theirs to be concealed privately. Once all players had finished their play, they were called into a separate room five at

a time. The envelopes of the players in that group of five were shuffled so that none of the players knew whose was whose. The envelopes of the five players were opened and counted, and the total amount was doubled. The money was then divided equally among the five players. The envelopes were coded in such a way that the experimenter could privately match the survey results to the amount in each envelope.

In figure 18.10, we see that the contributions in this game were widely dispersed, with the exception that everyone put at least something in the common pot, and there was a strong mode at 100 percent: 36 percent of the players chose to put their entire stake into the pot. Mean contributions for the whole group were 62 percent.

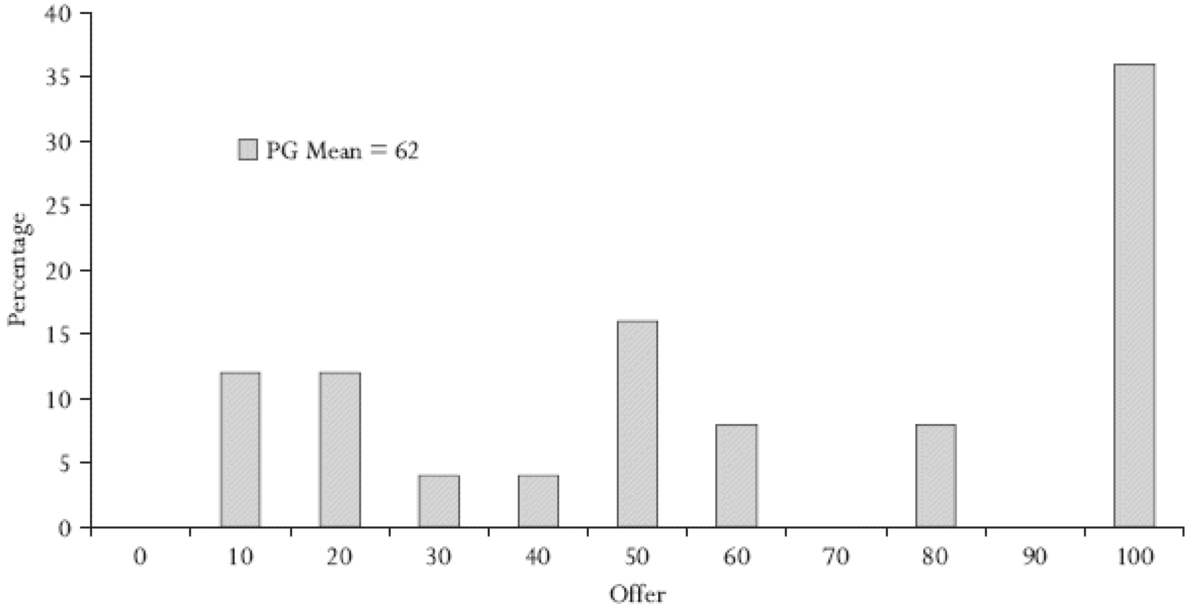
It is difficult to compare public goods experiments because so many parameters vary, including country, student versus nonstudent subjects, number of rounds, number of players, and type of reward. With that caveat, in Jennifer Zelmer's (2003) meta-analysis of public goods experiments, she found a mean contribution of 37.7, which places the results from the PG played in Hamilton (mean = 62 percent) very high on the scale.

TABLE 18.2 *Linear Regressions of Minimum Acceptable Offers in the Ultimatum Game*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	−0.13	−0.14	−0.13	−0.08		
	(0.27)	(0.24)	(0.23)	(0.20)		
Female dummy	−2.12	−2.05				
	(8.0)	(8.0)				
Education	0.34					
	(2.61)					
Individual income	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Household wealth	0.00005	0.00005	0.00005			
	(0.0001)	(0.0001)	(0.0001)			
Household size	−2.00	−2.08	−2.15	−1.91	−1.16	
	(3.89)	(3.65)	(3.64)	(3.51)	(3.01)	
Constant	43.92	48.69**	46.98**	45.07**	39.92***	35.19
	(42.85)	(16.99)	(14.62)	(14.27)	(9.70)	(5.80)
Observations	27	27	27	27	27	28
Model significance	0.70	0.58	0.45	0.43	0.34	0.17
Adjusted R-squared	0.12	0.12	0.12	0.11	0.11	0.08

Source: Authors' calculations based on author data.
Note: Corrected standard errors are in parentheses.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test

FIGURE 18.10 *Public Goods Game*



Source: Authors' calculations based on author data.

TABLE 18.3 *Linear Regressions of Offers in the Public Goods Game*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	0.87	0.36				
	(0.72)	(0.45)				
Female dummy	−24.32*	−24.03*	−24.04*	−14.64		
	(11.82)	(11.92)	(12.35)	(13.78)		
Education	3.59	3.04	3.51	4.45	3.89	
	(3.07)	(3.21)	(3.02)	(2.92)	(3.25)	
Individual income	−0.0007*	−0.0008**	−0.0007*	−0.0005	−0.0004	−0.0004
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Household wealth	−0.0001					
	(0.0001)					
Household size	5.22	6.60	5.62			
	(5.28)	(5.04)	(5.31)			
Constant	1.84	21.48	31.79	25.02	20.39	71.71
	(34.64)	(37.46)	(39.77)	(42.34)	(44.41)	(10.10)
Observations	23	23	23	25	25	25
Model significance	0.0007***	0.001***	0.015**	0.15	0.28	0.21
Adjusted R-squared	0.31	0.28	0.26	0.14	0.10	0.06

Source: Authors' calculations based on author data.
Note: Corrected standard errors are in parentheses.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

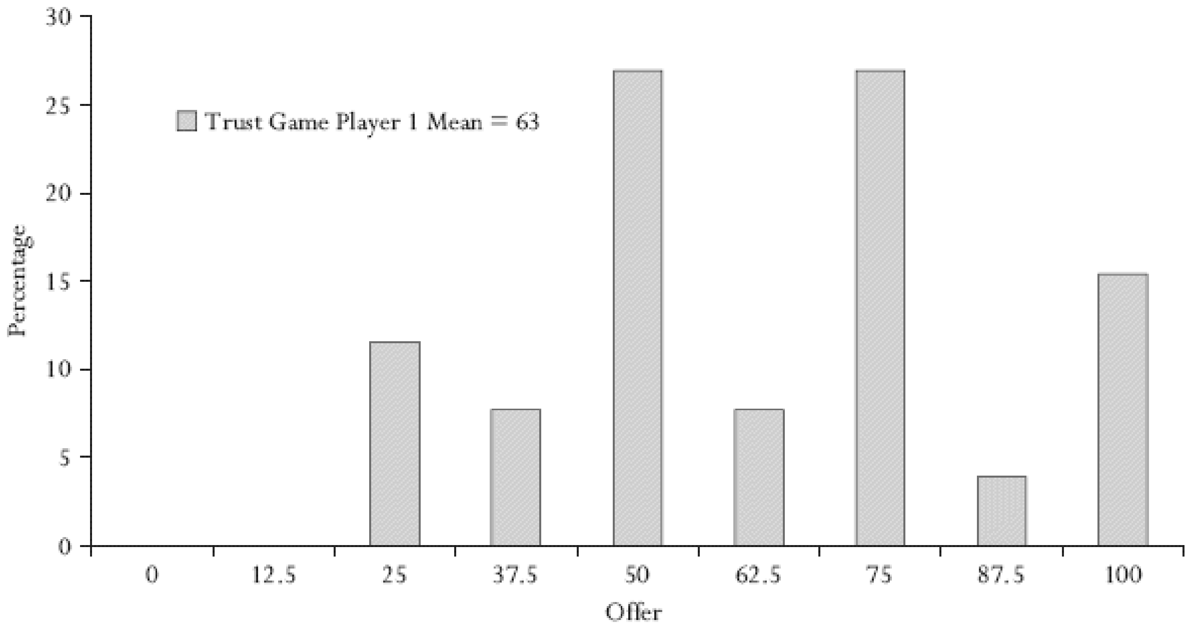
The demographics of those who played the public goods game are shown in table 18.1. They do not differ markedly from those of the overall sample of game participants. Given the variance in this game, we are able to run regression analyses on the offers, which are shown in table 18.3. We begin by controlling for age, sex, education, individual income, household wealth, and household size, then dropping the least significant variable in each successive model. In this case, income and gender are marginally significant at the 0.1 level with most of the control variables in the model. Neither of these variables is stable, however, and once the other insignificant variables are dropped, they lose even their marginal significance.

THE TRUST GAME

We played two sessions of the modified Berg, Dickhaut, and McCabe (1995) trust game. Both players were endowed with $40 each. Player 1 was invited to offer any portion of his or her stake (in $5 increments) to player 2 and keep the balance. Player 1's offer was tripled and presented to player 2. Player 2 had the option of returning any amount of the tripled transfer from him- or herself back to player 1, keeping any remaining balance, together with the original show-up fee. Player 1's offer provides a measure of trust, while the amount returned by player 2 provides a measure of trustworthiness.

In table 18.1, we find the demographics for the players of the trust game in relation to those who played all games and the census data for Hamilton. The data fall generally in line with what we have seen for the other games, but both household income and household wealth are on the slightly high side. The individual income of the players is in line with both the census data and of the demographics for all other game players.

FIGURE 18.11 *Trust Game Offers (Player 1; N = 26)*



Source: Authors' calculations based on author data.

In figure 18.11, we see the actual offers of the player 1s. There are strong modes at 50 percent and 75 percent, and a lesser mode at 100 percent. The stakes in this game were high. In the event of a fully cooperative player 1 and a fully cooperative player 2 who split the surplus equally with player 1, the take-home for each player was $80, including player 2's initial stake of $40. Alternatively, if player 1 sent player 2 his or her full stake and player 2 kept it all, player 2 went home with $160 ($40 from his or her original stake, plus the tripling of player 1's stake of $40). This was a lot of money in Hamilton, and comments from the players bore this out. As the decision dilemma sunk in for one player 2 confronted with the prospect of taking home $160, she remarked in dead seriousness, “That is a set of new tires; I need new tires.”

There is sufficient variance in trust game offers to run regression analyses, though the sample size is small. In table 18.4, we see that education is positively correlated with trust, while females are less trusting. Both results have substantial coefficients, and education is fairly robust against most control variables, with significance at $p < 0.05$.

In figure 18.12, we see the player 2 responses in the trust game. The percentage returns for player 2 represent the percentage of player 1's original

offer that player 2 returned to player 1. For example, if player 1 offered \$20 (50 percent of the original stake of \$40), player 2 received \$100 (\$60 from player 1 after the tripling, plus his or her own original stake of \$40). For both players to take home the same amount, player 2 had to return \$40 to player 1 (200 percent of player 1's original transfer of \$20); then both player 1 and player 2 would take home \$60. A return of 200 percent by player 2 was the modal behavior, and it represents an exact split of the surplus from the tripling.

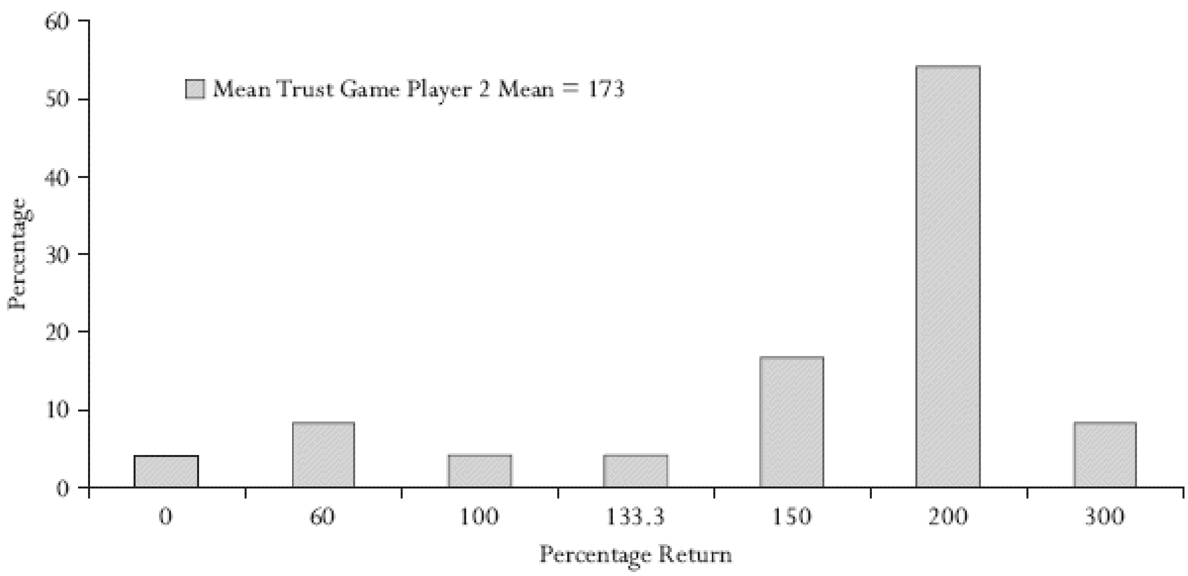
In table 18.5, we see the regressions on player 2 behavior to identify the correlates of trustworthiness. In addition to the six demographic control variables, we added the percentage received from player 1, since the level of trust proffered by player 1 may affect the level of return by player 2 in the trust game. In this study, the level of player 1's trust was not a significant variable predicting player 2's behavior, and the regressions change little whether they are run with or without this control. Age and household size are both correlated with trustworthiness, and household size carries a considerable coefficient and holds a statistical significance of $p < 0.01$ across all controls. It is intuitively reasonable that those who live in larger households have learned more about how to internalize the behavior of reciprocating trust. However, the correlate does not hold, as we saw earlier: those in larger households did not demonstrate any greater tendency to trust.

TABLE 18.4 *Linear Regressions of Offers in the Trust Game (Player 1)*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	0.19	0.17			
	(0.38)	(0.34)			
Female dummy	−18.94	−18.64*	−19.53*	−17.35*	−19.64**
	(10.61)	(10.00)	(9.41)	(8.68)	(8.53)
Education	5.06**	5.08**	4.97**	4.28**	4.41**
	(2.26)	(2.17)	(2.12)	(1.94)	(1.94)
Individual income	−0.0003	−0.0003	−0.0003		
	(0.0004)	(0.0004)	(0.0004)		
Household wealth	−0.000002				
	(0.00001)				
Household size	4.69	4.63	3.57	2.18	
	(4.51)	(4.40)	(3.92)	(3.30)	
Constant	−8.09	−8.12	4.16	9.78	15.04
	(41.15)	(39.48)	(27.91)	(30.88)	(28.87)
Observations	25	25	25	25	26
Model significance	0.07*	0.04**	0.02**	0.01***	0.005***
Adjusted R-squared	0.31	0.31	0.30	0.27	0.26

Source: Authors' calculations based on author data.
Note: Corrected standard errors are in parentheses.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

FIGURE 18.12 *Trust Game Returns (Player 2; N = 24)*



Source: Authors' calculations based on author data.

TABLE 18.5 *Linear Regressions of Returns in the Trust Game (Player 2)*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Percentage received from player 1	−0.39	−0.39	−0.37	−0.04	0.210
	(0.70)	(0.68)	(0.65)	(0.45)	(0.42)
Age	3.81**	3.82**	3.93***	3.31**	2.46*
	(1.60)	(1.53)	(1.38)	(1.24)	(1.26)
Female dummy	1.73				
	(27.78)				
Education	2.63	2.57			
	(6.61)	(6.74)			
Individual income	−0.0007	−0.0007	−0.0006		
	(0.001)	(0.0008)	(0.0008)		
Household wealth	−0.0001	−0.0001	−0.0001	−0.00009	
	(0.00007)	(0.00007)	(0.00007)	(0.00006)	
Household size	29.64***	29.66***	30.75***	28.41***	25.72***
	(7.93)	(7.77)	(7.94)	(7.00)	(6.91)
Constant	−52.83	−50.90	−24.29	−33.45	−24.38
	(94.32)	(94.67)	(58.86)	(56.27)	(58.71)
Observations	24	24	24	24	24
Model significance	0.07	0.04	0.01	0.006	0.007
Adjusted R-squared	0.50	0.50	0.49	0.46	0.39

Source: Authors' calculations based on author data.
Note: Corrected standard errors are in parentheses.
***Coefficient significant at < 0.01 level in two-tailed test
**Coefficient significant at < 0.05 level in two-tailed test
*Coefficient significant at < 0.10 level in two-tailed test

Noel Johnson and Alexandra Mislin (2011) have compiled a comprehensive meta-analysis of trust experiments around the world. Their paper drives home exactly how difficult it is to make comparisons among the many versions of trust game experiments we now find in the literature. Two of the parameters that seem most crucial for making proper comparisons are whether or not player 2 was endowed, and whether the subjects were students or nonstudents. Joyce Berg and her colleagues (1995) chose to endow player 2s in their original experiment; any failure to do so greatly changes the equity calculations for both players, so it is not appropriate to make comparisons across this protocol change. We can also expect that there are differences in trust and trustworthiness (both measures of prosociality) between student and adult populations, as we have already seen for the other games.

One of the trust experiments most relevant for comparison to this one is that of Armin Falk and Christian Zehnder (2007), who, like us, report on a trust experiment from the developed world (Zurich, Switzerland). This trust

experiment was modeled on the Berg experiment: player 2 was endowed, and the subjects were drawn broadly from the city of Zurich (not from a university population). The findings are presented rather differently from those we see here. The trust behavior mean is about 66 percent (Falk and Zehnder 2007, 9 and 24), and the trustworthiness response is approximately 175 percent (13 and 26). These results are virtually identical to our results of 63 versus 173 percent. Just as was the case in this study, the return behavior documented by Falk and Zehnder come close to the pure equity result, represented by a 200 percent return. Compared to the player 1 mean behavior of 54 percent and the player 2 mean response of 90 percent in the original experiment by Berg and her colleagues (1995) with students, we see that these two nonstudent populations demonstrate considerably higher prosociality.

CONCLUSIONS

The message from these experiments is quite straightforward. Across the dictator, strategy method ultimatum, public goods, and trust games, we have extremely high and consistent measures of prosociality for this rural U.S. population of nonstudents. This tendency holds for the offers in all games, for the rejection behavior in the UG (where 30 percent rejected offers of even 40 percent), and for the trustworthiness of player 2s in the trust game (who nearly equally split the surplus with their partners). We were able to run regression analyses only on the public goods and trust games because there was virtually no variation from the modal offer of 50 percent in both the DG and the UG. Our regression analysis pointed to education being positively correlated with trust and women being less trusting than men. However, the sample sizes were small, and the lack of robust results across games for our demographic variables suggests that the real story is the degree of consistency in high prosociality across all demographic categories.

Although the results from all of the games demonstrate higher offers than we are used to seeing in the literature for student populations on university campuses in Western societies, there are now increasing numbers of other studies from nonstudent populations in the developed world that report similar levels of prosociality. Together with those studies, these results appear to contradict the speculation of Levitt and List (2007) that the behavior of student subjects may *overestimate* the level of prosociality in the

real world. Based on this growing body of evidence, it now appears that results from student laboratories *underestimate* the true level of prosociality in the real world. This has now been documented here for rural America, by Falk and Zehnder (2007) for urban Europe (Zurich, Switzerland), by Henrich and Henrich (2007) for an urban U.S. population, and in a variety of U.S. business communities (Carpenter, Burks, and Verhoogen 2005; Hoffman and Morgan 2011). Finally, the results from Hamilton, Missouri, are completely consistent with the major findings of this volume. As the society with the highest market integration of our sampled sites, together with deep roots in a world religion, this rural U.S. community produced data that fall in line with the overall patterns we see across societies around the world.

We wish to thank the Russell Sage Foundation for generous research support that made the Missouri portion of these experiments possible.

NOTES

1. These numbers include participants in two other games: a simplified trust game that was piloted and abandoned in favor of the design employed here and a double-blind dictator game (for results from the latter game, see chapter 5).

2. The percentage offers reported here are estimates based on approximate readings off of printed charts in Engel (2011).

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